

Federal Grant  
Electronic Commerce Committee

# EC Project Plan

Second Edition  
May 1997



This plan was prepared for the Federal Grant Electronic Commerce Committee  
by the Logistics Management Institute (LMI).



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# Preface

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The Federal Grant Electronic Commerce Committee (ECC) is composed of representatives of numerous federal agencies that provide support for science, technology, education, the environment, and infrastructure as a way of promoting social and economic development. The committee's goal is to replace paper with electronic data as the medium of information exchange. The following agencies are members of the EC Committee and contributed to the development of this plan: Air Force Office of Scientific Research, Army Medical Research (Acquisition Activity), Army Research Office, Centers for Disease Control and Prevention, Department of Education, Department of Energy, Department of Health and Human Services, Department of Transportation, National Institutes of Health, National Science Foundation, and the Office of Naval Research.

This support is provided in many forms but commonly includes the following:

- ♦ Research grants and contracts—awarded mostly to institutions of higher education, but also many other types of organizations, to stimulate innovative research. Health, energy, space, aviation, and other sciences represent some of the broad areas included in the research program.
- ♦ Block, discretionary, and formula grants—typically awarded to state or local governments. These grants promote a wide variety of goals, including improving infrastructure and establishing new programs and services. Transportation, education, and environment are three of the many areas these grants target.

Administering these diverse programs is a challenging endeavor. The processing cycle of a typical research grant requires defining the requirement where research is desired; announcing the availability of grants; receiving and evaluating applications; making and modifying awards; tracking progress; issuing funds; monitoring fund usage; and closing-out the completed grant. Each step requires work and the exchange of information by both the federal agency and the recipient. Each of these steps is both labor- and paper-intensive, and frequently takes a significant amount of time to complete.

Electronic transmission of data is expected to reduce costs and delays, while improving data quality and the services offered in administering grants. These improvements will benefit both the federal agencies and support recipients.

This second edition of our plan provides background to the EC effort, describes overall goals and objectives for federal support EC, and identifies the specific steps to be taken to get there. It also documents the substantial progress we have made over the past year; a few of the highlights include the following:

- ♦ Developing an approved federal implementation convention for the 194 Grant or Assistance Application transaction set.
- ♦ Programming agency systems to begin exchanging test and production grant applications
- ♦ Developing a data element dictionary and sample World Wide Web screens to use as part of a Web site for grants.
- ♦ Developing an interagency application for invention reporting.

Our plan continues to be a dynamic working document. While its goals are expected to remain steady, its objectives, strategies, issues, and time lines will change periodically, as new information becomes available and the project grows and matures. Because participants in this plan are at different stages of evaluating, reinventing, and automating their business practices, they will implement EC initiatives at different rates under differing sets of priorities. During that process, this plan should continue to provide a focus for discussion, a standard for interagency cooperation, and a framework for action.

# Chapter 1 Introduction

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Electronic commerce (EC) embraces many technologies used to streamline business operations in ways that will reduce operating costs while at the same time improve business performance. Among these are electronic data interchange (EDI) and various technologies that take advantage of new capabilities on the World Wide Web (WWW, or Web). EDI has been widely used in the private sector for many years and is being used increasingly in government operations at all levels (federal, state, and local). Use of the World Wide Web is a more recent phenomenon that has gained widespread acceptance across all sectors and among the general public. The federal government has embraced a strong EC program in numerous business areas, including procurement, logistics, transportation, customs, and taxation.

The Federal Grant EC Committee realizes the potential of EC to improve our administration of federal support.<sup>1</sup> The committee members are fully participating in the federal EC effort and are undertaking to implement it in federal support administration.

## BACKGROUND AND ORIGINS OF THE EC COMMITTEE

### Federal Research Managers Group

In 1992 leaders from the National Science Foundation (NSF) and three research organizations<sup>2</sup> within the Department of Defense (DoD) met to discuss ways they might share information and resources that would benefit each other and their supporting research community. These discussions led to a partnership under which they agreed to work together in a number of areas, including technical staff exchange, cooperative program development, and common business practice implementation. Now called the Federal Research Managers Group, or FRMG (formerly known as the Tri-services Group), it has since expanded to include additional agencies and continues to meet quarterly as needed.

### Business Practices Working Group

To develop improved and common business practices, the FRMG established the Business Practices Working Group (BPWG). The BPWG is composed of a representative from each participating agency. Like the FRMG, the BPWG membership has expanded and now includes 15 agencies. The group meets quarterly to discuss how to streamline grant administration and to establish specific initiatives. It participates actively in Vice President Gore's National Performance Review (NPR) initiatives to reinvent government.

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<sup>1</sup> Federal support is financial and other assistance provided by federal agencies to accomplish specific tasks. Types include block, discretionary, formula, and research grants; research contracts; and cooperative agreements.

<sup>2</sup> Air Force Office of Scientific Research (AFOSR), Army Research Office (ARO), and Office of Naval Research (ONR).

Several of the BPWG initiatives focus on emerging technologies such as EC, which some of the participating agencies were previously developing independently. Because of the advanced state of the EC effort and the range of skills and time required, the BPWG established the Federal Grant EC Committee in December 1993 to provide a forum for sharing technical information about continued progress.

## Federal Grant EC Committee

As with the BPWG, each agency selected a representative to participate on the committee. Also like the BPWG, it has grown since its inception. The first task of the EC Committee (ECC) was to develop a means to transmit a research grant application (proposal) electronically rather than by paper, using a data element dictionary of all information transmitted in the application. This effort was completed in the spring of 1994. Next, recognizing the broad federal effort to use EDI, the committee began working with the Logistics Management Institute (LMI) on employing EDI to transmit the grant proposal administrative information. The committee's efforts have progressed and expanded in the intervening 2 years to include

- ♦ data exchanges beyond the proposal: awards, award acknowledgments, solicitations, trading partner registration and profiles, and progress reporting;
- ♦ other agencies;
- ♦ types of grants other than research grants; and
- ♦ specific implementation issues.

## PURPOSE

This plan is written to communicate overall goals, the benefits that will accrue to both our agencies and trading partners, and the many specific steps to begin to reach those goals.

Our audience for this plan includes our managers and coworkers at our respective agencies; members of other federal agencies who might be interested in joining us; organizations responsible for coordinating federal streamlining initiatives (e.g., the Federal EC Program Management Office [FECPMO] and the NPR); but most especially our trading partners.

This plan will document our team approach to implementing EC in federal support. To the greatest extent possible we will establish a "single face" to our trading partners, while recognizing the need to tailor the overall EC effort to meet agency-unique mission and business requirements. Our approach must move our existing paper-intensive business operations into a paperless, electronic environment. Our ultimate goal must be to integrate business process reengineering efforts with EC in order to fulfill the Federal Grant EC Committee vision.

In this plan, we describe a conceptual framework for EC implementation; present our goals, objectives, and strategies; identify our supporting technical architecture; and provide an implementation time line.

## OUTLINE

Along with this introductory section, the next several chapters constitute our project plan.

- ♦ *Chapter 2* describes EC and technological options and how they gained widespread federal acceptance.
- ♦ *Chapter 3* presents our conceptual framework for implementing EC. It is based on our vision of EC and focuses on developing our project plan.
- ♦ *Chapter 4* presents the goals, objectives, and strategies we are using to meet our EC vision. (Goals are broad statements of direction, objectives are more specific steps needed to attain the goals, and strategies describe the approach used to achieve one or more objectives.)

The remaining chapters organize our objectives and strategies in the form of a project divided into specific areas.

- ♦ *Chapter 5* identifies management techniques for implementing EC.
- ♦ *Chapter 6* describes functional requirements for the EC project.
- ♦ *Chapter 7* explains the technical infrastructure and other issues related to developing and operating the federal support EC project.
- ♦ *Chapter 8* presents the details of the initial implementation of EC.
- ♦ *Chapter 9* explains our trading partner outreach program.



# Chapter 2 Options for Electronic Commerce

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## THE MANDATE TO CHANGE

The mandate to change the work environment is clear, and it applies to both the private and public sectors.

Commercial practices are changing to meet numerous challenges. The advent of the global economy offers both the opportunity of a global market and the threat of global competition. The time available to bring a new product to market ahead of the competition is shrinking, as is the time it can be produced and sold before new products replace it. Companies are turning to technology and innovative business approaches to be more competitive.

In the federal government the need to change is equally clear. Most agencies will see future staff and budgets either remain constant or decrease while mission requirements increase. As in private industry, technology and innovative approaches are key to meeting these challenges. The NPR and reinventing government are initiatives to improve our business operations, and EDI plays a prominent role in them. Also, as in private industry:

*Revising business practices is not merely a response to shrinking resources: it is the opportunity to proactively improve the work environment and the timeliness, scope, and quality of the services the government provides.*

State and local governments, including the university-based research community, face the same challenges but frequently possess even fewer resources to meet them making the mandate to employ new technology and business approaches even more essential.

In this chapter we will briefly discuss some of the technologies that we will use to improve our business processes. Here and throughout this plan we will be emphasizing technologies through which data can be exchanged between grants trading partners.

## ELECTRONIC COMMERCE

The term “electronic commerce” was brought into wide use by the Defense Logistics Agency. It has been used in the government since the early 1990s but has become recognized in business literature only in the last few years. In short, EC is any use of automated information systems or electronic data that drives paper from the workplace. More formally, it is a *philosophy for conducting business in an integrated and automated paperless information environment*. Its tools are many and varied: EDI, the Internet, the World Wide Web,

electronic mail (E-mail), electronic funds transfer (EFT), CD-ROMs, electronic imaging systems, bar coding, data warehouses, and other computer-based technologies.<sup>3</sup>

The initial program to apply these technologies in high-payoff areas has broadened into a federal-wide EC initiative. By building electronic information bridges within government agencies and with trading partners, the initiative seeks the following direct and indirect benefits:

- ♦ Streamlined and simplified procedures
- ♦ Lower data entry costs and more accurate information
- ♦ Reduced mailing costs and faster communications
- ♦ Reduced paper-handling costs, including for reproduction and storage
- ♦ Better management of inventory and other assets
- ♦ Improved cash management.

EC means more than just automating manual processes and eliminating paper transactions. The EC program will eventually move the government and its trading partners into a fully electronic environment and fundamentally change the way they operate. The federal government is embracing EC because it recognizes that information-processing technology is the multiplier needed to improve operating efficiency and mission effectiveness within today's resource constraints. Like EDI, EC technology alone will not yield the required improvements; EC must be merged with revised business processes to realize all the benefits of paperless operation. The following sections describe some specific EC tools that can be used in the federal support business area.

## Electronic Data Interchange

One approach is to replace paper as the means to convey information with EDI. Using EDI in conjunction with process reengineering concepts has proved to be an effective productivity multiplier, both in industry and government.

DoD first used electronic transactions to pass logistics data in the 1960s. This experience was subsequently transferred into private industry, where its first large business application was in tracking transportation assets such as railcars and containers. Use of these electronic formats grew steadily. In the mid-1970s, the American National Standards Institute (ANSI) established a new Accredited Standards Committee (ASC), X12, to develop a national standard for EDI.

Becoming a national standard quickened the pace of EDI expansion. The banking, transportation, automotive, grocery, and other industries have successfully replaced paper purchase orders, bills of lading, invoices, payments, and other forms with electronic transactions. Almost all of the *Fortune* magazine top 1,000 companies use EDI to some extent. (Later sections of this chapter will describe federal policy for adopting EDI.)

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<sup>3</sup> As described above, the terms "EC" and "EDI" have distinct meanings. However, as EDI has been such a key component of EC, the difference in the meanings has become blurred, and they are often used interchangeably. In this report we will use EC to include EDI; however, we will use EDI to refer to data exchanges specifically associated with Accredited Standards Committee (ASC) X12 transaction sets.

EDI transactions represent paperless business information exchanges that are independent of either partner's unique business processes, computer software, or hardware. This approach provides flexibility and does not impose the requirement of common hardware, software, business processes, or terminology upon the diverse participants, only common data usage and transmission formats.

Implementing EDI should not be a goal in and of itself but part of a larger effort to improve business practices. Even if EDI is used to simply replace paper while leaving the existing business processes in place, it will bring benefits, including reduced data entry and mailing costs, more accurate information, faster communications, and decreased paperwork and reproduction. However, fully exploiting the EDI potential requires reengineering the business to bring about the greater advantages of

- ♦ faster processing of actions;
- ♦ availability of timely and accurate data for decision-makers;
- ♦ lower personnel requirements; and
- ♦ a responsive environment that supports innovations, such as direct vendor delivery, flexible manufacturing, rapid distribution, and central pay.

EDI was in its developmental stages in the late 1960s to the mid-1970s; now, some 20 years later, it is both mature and stable. The Internet, which began in the 1980s as a network to link DoD researchers, has virtually exploded upon our society in the mid-1990s and offers significant opportunities to exchange data.

## Internet

The Internet is the interworking of existing corporate and government networks using common telecommunications standards. It is based on the mutual interest of users to communicate more effectively via electronic message and file transfers. Many universities and research organizations (more so than commercial firms) have been working with the Internet for many years.

Internet service providers (ISPs) furnish generic network access for all computers connected to the Internet. The Internet works by assigning names or "domains" to networks, companies, and machines. Your Internet Protocol (IP) address and domain name must be registered in the Domain Name Service.

Internet communications may be person-to-person E-mail, or a process-to-process data transfer like EDI. Transmission of a modest amount of data with a dedicated connection can occur in a matter of seconds. The speed depends on how close the trading partners are to an Internet "backbone." The Internet uses Hypertext Transfer Protocol (HTTP), an application-level protocol with the speed necessary for distributed, collaborative, hypermedia information systems.

As a communications network, the Internet can be used to carry EDI transactions, Hypertext Markup Language (HTML), E-mail, and any other type of file format. The Internet may serve as an alternate to using commercial telephone lines and value-added networks (VANs), which are the traditional commercial approach to EDI transmission. Through the HTML format, the Internet also provides access to the World Wide Web.

## World Wide Web

The WWW was created to be a wide-area, hypermedia, information-retrieval system, giving universal access to a large realm of documents. Originally intended only to link documents, the Web can now be used to transmit pictures, audio, and movies. Currently, it is the most advanced information system deployed on the Internet. In fact its visual capability is one of the strongest appeals of the WWW.

Whereas the Internet is the path, the WWW provides the source of data (Web sites) and the road map of where to find it (browsers).

### WEB SITES

Organizations (and individuals) can prepare any nature of documents and data on a computer that has an Internet address and is therefore publicly accessible. Corporations are using Web sites to advertise and sell products. Universities are using them to describe their environment and to display course catalogs and other information to both prospective and current students. Government sites are also displaying information regarding their services.

The WWW provides the opportunity for the agencies to establish Web sites where trading partners can access both information about available grants and their status. Further, such sites can serve as a basis for submitting applications, progress reports, and other data submissions.

### WEB BROWSERS

The WWW may be accessed by running a browser program (e.g., Netscape, Mosaic, MS Internet Explorer). A powerful feature of browsers is that the user can run text string searches of Web site contents to find sites that meet their information query. The browser then displays the sites matching the query, and the user can select the sites to view. Most documents are in HTML format and may contain hypertext links to other documents on the same site or a different one. Many sites make documents and images convenient for users to download onto their own machines.

Another powerful feature of the WWW is sites that are subject-oriented directories consisting of links to other Web sites with information on the specified topics. Such sites can be key to finding relevant sites and documents.

## Intranets and Extranets

An intranet is the concept of combining web sites, HTML format, and browsers to manage, distribute and share information within an organization (in many ways being a rival concept to “groupware” packages such as Lotus Notes). Extranets extend this concept to more than one organization, but not publicly as with the WWW. The intranet approach marries internal document format management techniques with those of the WWW, which makes presenting, accessing, and transporting documents completely fluid. It is also completely flexible across a variety of document types.

## Electronic Mail

E-Mail is noninteractive communication of text, data, images, or voice messages by systems using telecommunications links.

Like regular mail, E-mail travels to a particular individual or organization using addresses and mailboxes for routing and storage. Conceptually, sending E-mail is just like sending a letter. A message goes into a central collection and sorting point (the host computer) and is then distributed to the recipient's mailbox, where it sits until the addressee picks it up.

However, E-mail has some distinct advantages over regular mail. Instead of several days, an E-mail message can reach the other side of the world in hours, minutes, or even seconds.

## Electronic Funds Transfer

Electronic funds transfer is the banking equivalent of EDI. Banks and other financial institutions transfer electronic checks and related payment information to each other, crediting and debiting customer accounts. EFT transactions are generally exchanged between banks through some form of network or funds transfer system. The most commonly used network is the Automated Clearing House (ACH) Network, made up of 42 regional hubs and 15,000 participating financial institutions. As business demands increase and technology improves, several bank-to-bank EFT formats have been developed for the ACH Network. The main difference between the formats is the amount of payment information that can be attached to the payment order.

## EC IN FEDERAL POLICY

Numerous federal policy statements have underscored the use of EC for reengineering government. The following examples illustrate that emphasis.

### National Performance Review

The National Performance Review report of September 1993 cited EC as the key element in achieving many of the suggestions for reengineering government. Specific NPR recommendations include the following:

- ♦ "Use electronic funds transfer . . . to handle all interagency payments, to make payments to state and local governments, and to pay for purchases from the private sector."
- ♦ "Establish a government-wide program to use electronic commerce for Federal procurements."
- ♦ "Improve electronic mail and messaging among Federal agencies."
- ♦ "Develop a Government Information Infrastructure to use government information resources effectively and support electronic government applications."

## GOVERNMENT INFORMATION TECHNOLOGY SERVICES BOARD

One result of the NPR and the initiative to reengineer the federal government was establishing the Government Information Technology Services Board (GITSB). The board was established in December 1993 by Vice President Gore to strengthen the application of information technology within federal agencies and tasked to implement information technology initiatives in a variety of areas.

As of May 1997 the board is planning to establish a U.S. Electronic Grants Intergovernmental Working Group (EGIWG) to integrate and expand plans and grants pilot efforts utilizing multiple technologies.

## Presidential Memorandum for Procurement Streamlining

Presidential memorandums reaffirm the administration's support for the NPR's objectives and direct the executive branch to begin implementing them aggressively. One such memorandum<sup>4</sup> identifies the objectives of, and provides an implementation schedule for, streamlining the procurement process using EDI. Because those objectives employ a universal approach readily adaptable to many of our business practices, we present them here:

- ♦ "Exchange procurement information—such as solicitations, offers, contracts, purchase orders, invoices, payments, and other contractual documents—electronically between the private sector and the federal government to the maximum extent practical."
- ♦ "Provide businesses, including small, small disadvantaged, and women-owned businesses, with greater access to federal procurement opportunities."
- ♦ "Ensure that potential suppliers are provided simplified access to the federal government's electronic commerce system."
- ♦ "Employ nationally and internationally recognized data formats to broaden and ease the electronic interchange of data; and use agency and industry systems and networks to enable the government and potential suppliers to exchange information and access federal procurement data."

## Federal Acquisition Streamlining Act

The Federal Acquisition Streamlining Act (FASA) was signed by the President on October 13, 1994. This legislation reinforces the President's memorandum for using EDI in acquisition and establishes significant agency incentives for doing so. It requires the government to evolve its paperwork-driven procurement into an expedited process based on EDI. FASA also established the term Federal Acquisition Computer Network (FACNET) to describe the overall paperless approach, but also requiring the agencies to develop a specific network to move data between government agencies and contractors.

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<sup>4</sup> Presidential memorandum, *Streamlining Procurement Through Electronic Commerce*, October 1993.

FASA also increased the simplified acquisition threshold to \$100,000 (from \$25,000) for agencies that have the required FACNET certification. This threshold now applies to FACNET or non-FACNET solicitations.

## Federal Information Processing Standards Publications

Federal Information Processing Standards Publications (FIPS PUBs) are issued by the National Institute of Standards and Technology (NIST) after approval by the Secretary of Commerce.

FIPS PUB 161, released in March 1991, designated the standards that are approved for exchanging electronic data between federal agencies and with private industry for certain types of transactions. They are the standards promulgated by the ANSI ASC X12 and the United Nations EDI for Administration, Commerce and Transport (EDIFACT) groups.

FIPS PUB 161-2, which replaced the original 161, was released in 1996. It defines a federal organization for EDI deriving from the presidential memorandum and FASA. It contains references to documents and organizations, and new guidance to agencies on selecting national and international standards and implementation conventions (ICs).

## Federal EC Program Management Office

The FECPMO was created in response to the presidential memorandum on implementing EC within the government. The Federal EDI Standards Management Coordinating Committee (FESMCC), established by FIPS PUB 161-2, comprises procurement, finance, and other functional working groups (FWGs). The NIST is the federal IC secretariat.

The goal of the FESMCC is to ensure a single government face to trading partners, consistency among instances of an application across agencies, streamlined data, and coordinated government representation at standards bodies. Functions of the committee include harmonizing development of EDI transaction set and message standards among federal agencies and setting government-wide implementation conventions for each EDI application that federal agencies use. The committee is responsible for developing and maintaining the ICs that all federal agencies will use to implement ASC X12 standards. Working groups will be established under the FESMCC in areas such as finance, procurement, and transportation. Members of the committee shall come from federal agencies using or planning to use EDI. The Office of Management and Budget (OMB) will approve the selection of the committee chair.

## FEDERAL ASSISTANCE ADMINISTRATION

We believe that EC offers both federal agencies and our trading partners the same benefits that it has provided to other business areas. Among our goals is to make grant opportunities visible through one or more electronic locations where potential applicants can see the full range of available federal assistance. Applicants will submit proposals electronically. Agency business processes to review the proposals will be redesigned to use

electronic capabilities. Awards, postaward reporting, and financial exchanges will all occur in an electronic environment.

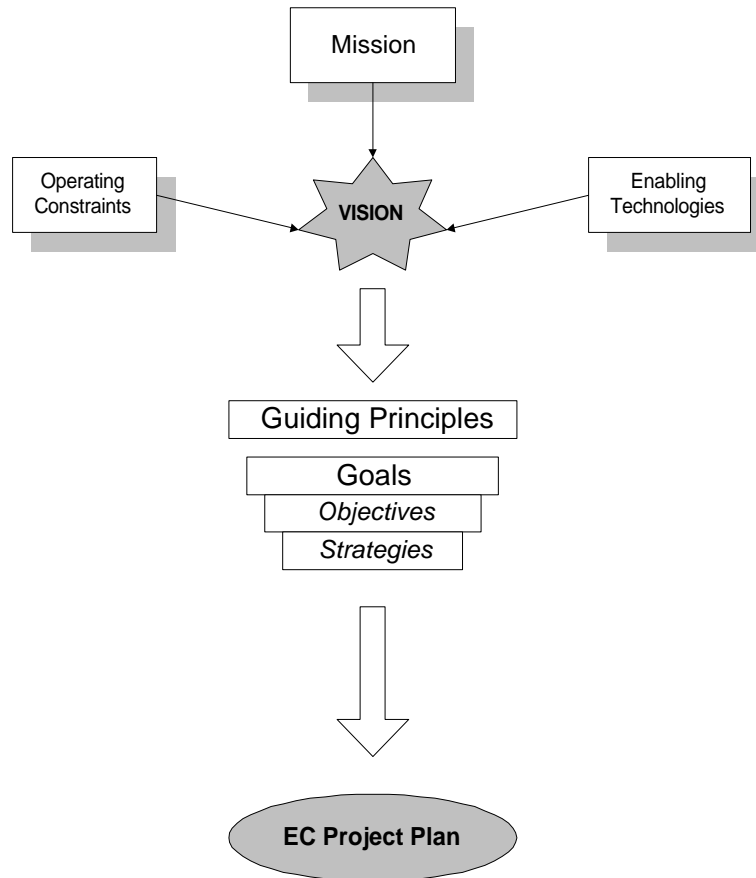
Reengineering business processes by both federal agencies and trading partners combined with EC offers the following benefits for both sides:

- ♦ Reducing the time and cost to receive and evaluate proposals and make awards
- ♦ Providing easy-to-obtain current status of proposals under evaluation
- ♦ Establishing a shared system of organization profiles to reduce applicants' repetitive submission of standard, seldom changing information
- ♦ Simplifying and speeding up the transfer of funds
- ♦ Retaining more application and award data electronically in order to respond more quickly and accurately to congressional and administration inquiries
- ♦ Reducing the time and cost to prepare a proposal
- ♦ Achieving more accurate and consistent data in different proposals by the same organization
- ♦ Simplifying submission of the same or similar proposals to multiple agencies, where appropriate
- ♦ Reducing the burden on applicants to prepare proposals and support research administration activities.

We believe these are just a few of the improvements that we will see in moving to electronic grants administration. The following chapters describe our vision, goals, objectives, and plans in greater detail.

## Chapter 3 EC Implementation Framework

This chapter defines the context of our EC project plan. The EC implementation framework (Figure 3-1) is presented as it relates to our group's vision. After presenting the details of this framework, we will identify our goals, objectives, and strategies.



**Figure 3-1—EC Implementation Framework**

### VISION

Our vision gives our group criteria for success and a source of motivation. It states what our group is striving for:

*We will achieve the paperless exchange of federal support information throughout the federal government and between federal agencies and their trading partners, to better utilize resources.*

## IMPLEMENTATION FRAMEWORK

Achieving our vision requires us to determine our mission; to consider the role various operating constraints and enabling technologies will play in implementing our plan; to devise a careful planning process; and to establish the guiding principles, objectives, goals, and strategies that constitute our initial project plan.

### Mission

Our mission states the role our group will play in providing services to our customers:

*We will develop, promote, coordinate, and maintain the use of standardized data and the electronic exchange of federal support information.*

### Operating Constraints

While achieving the EC vision, to maximize enabling technologies and scarce resources, we will account for budgetary, regulatory, or policy-driven constraints that limit our available options in performing the mission. Examples of such constraints include statutes, policies, budget, staff, trading partner capabilities, and management authority (sponsorship).

### Enabling Technologies

EC-related technologies include any tool that enables the creation, transmission, or processing of business transactions by electronic rather than paper means. Specific EC-enabling technologies include those described in Chapter 1 (the Internet, WWW, E-mail, EFT, and EDI) and many others.

### Guiding Principles

Guiding principles are broad statements that define the values, concepts, purpose, scope, and implementation direction to be taken in achieving a vision. They are the foundation for developing program goals. We have designed the following guiding principles that support federal EC implementation and provide a framework for program and project management:

- ♦ We will improve quality, increase productivity, and control the cost of operations by removing non-value-added business processes and information exchanges. EC requires not only the automation of manual processes but also a fundamental change in business operations to eliminate redundant and obsolete processes.

- ◆ We will establish an efficient, flexible, and reliable EC architecture in conjunction with other federal agencies. The architecture will ensure that trading partners have easy access, design can be scaled up or down as needed, ongoing initiatives are exploited, a seamless transition to the federal architecture is achievable, resources are shared when feasible, and alternative approaches and choices are offered.
- ◆ We will incrementally expand the project until we achieve full EC. We must move beyond our initial successes into every aspect of our business processes and activity base.
- ◆ We will continue to promote decentralized project management. Central management authorities will empower implementing organizations with whatever they need to succeed and will intervene only when necessary. Central management will play a major role in preventing redundancy, analyzing, and controlling.
- ◆ We will ensure that any new operating or management items add value that exceeds any negative effect the items may have on all implementing organizations.
- ◆ We will develop standards to facilitate flexible implementation of electronic commerce. We will not only develop standards, but also perform standards testing and implementation.

## Goals

Goals are general statements of what our group needs to achieve to realize our EC vision. We have set the following goals for the federal support EC initiative:

- ◆ Establish a common face for exchanging federal support data.
- ◆ Ensure that EC is implemented and conducted in a manner that utilizes fiscal and human resources effectively.
- ◆ Improve information sharing among EC participants.

## Objectives

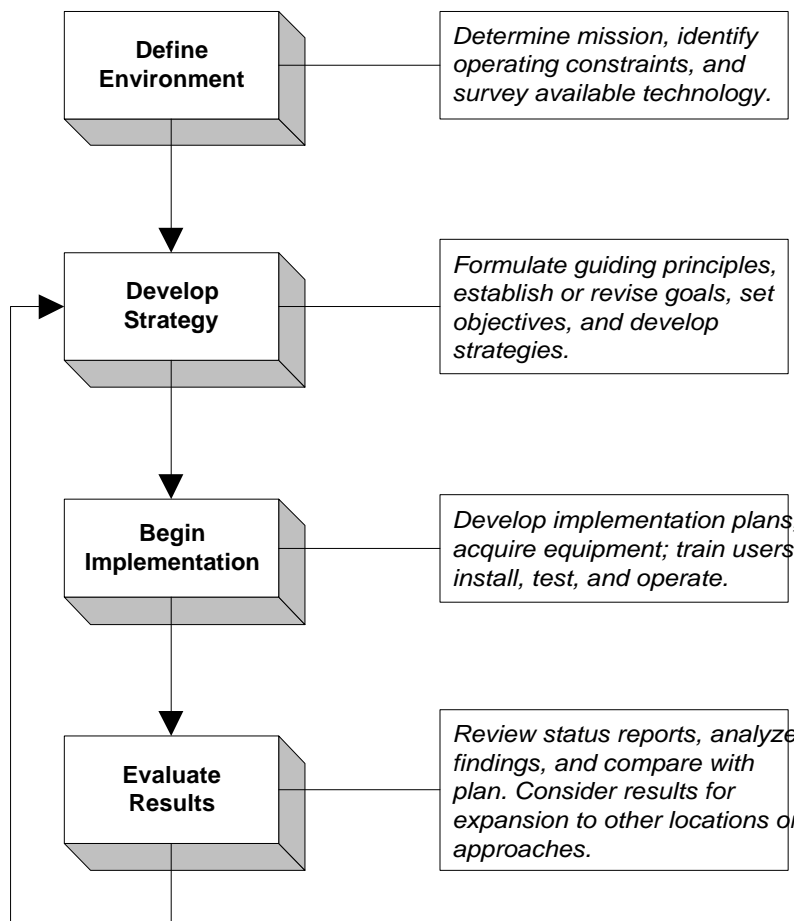
Objectives detail specific areas requiring action in order to achieve a program goal. We have developed statements of objectives and grouped them in Chapter 4 with the goals they support. These objectives are realized by executing individual strategies.

## Strategies

Strategies identify specific courses of action that will be taken to achieve objectives. In support of our objectives, we have developed associated strategies that describe how we intend to achieve our goals and objectives. Chapter 4 presents the individual execution strategies for each objective. We have designed them to ensure a cohesive strategic approach to developing and managing the EC project.

## The Planning Process

The key to achieving our vision is a carefully planned approach to developing and maintaining the EC program. Figure 3-2 portrays our project planning approach. Implementing organizations are responsible for planning and managing individual projects as well as for providing input to the EC Committee's project plan. This team concept makes our EC planning a closed-loop process because we will use the results achieved by the implementing organizations to develop goals, objectives, and strategies. This feedback ensures continuous improvement by allowing everyone to capitalize on successful pilot projects and makes this project plan a living document.



**Figure 3-2—EC Planning Cycle**

# Chapter 4                      Goals, Objectives, and Strategies

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We have described goals as general statements of what the EC Committee should achieve with respect to our overall project plan and guiding principles. Using the guiding principles presented in Chapter 3 as a foundation, we have developed goals to achieve the EC vision.

We have enumerated our goals as the following:

- 1) Establish a common face for exchanging federal support data.
- 2) Ensure that EC is implemented and conducted in a manner that uses fiscal and human resources effectively.
- 3) Improve information sharing among EC participants.

The remainder of this chapter describes these goals in greater detail. We have identified objectives for each goal and have developed specific strategies for achieving those objectives. In this update of the plan we have also described our progress over the last year in executing the specific strategies.

Following this chapter, Chapters 5 through 9 present our plan in terms of a typical EC project implementation plan. It divides our effort into five broad areas (project management, identifying functional requirements, etc.), develops specific taskings, assigns responsibilities, and establishes milestones. This arrangement simply represents a different view of the same data. Every specific strategy found in this chapter will also be found somewhere in Chapters 5 through 9 (the reverse may not be true, as the subsequent chapters provide more detail).

## GOAL #1—ESTABLISH A COMMON FACE FOR EXCHANGING FEDERAL SUPPORT DATA

### Objective 1.1

For each electronic exchange (e.g., an application or an award) determine the core set of information that meets the criteria of all agencies.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Establish a joint data element dictionary.  |
| <b>Required Actions:</b> | Combine all agency data requirements to create a data element dictionary.   |
| <b>Responsibility:</b>   | All agencies  |
| <b>Action/Status:</b>    | <p>A data element list has been completed for the 194 Grant or Assistance Application transaction set and a WWW page. (Note: The National Institutes of Health [NIH] are also developing a means to transmit grant application data via HTML). Minimum and maximum lengths have been established for all of these data elements. However, these lists represent the maximum set of data elements (i.e., used by one or more agencies). Work will continue on developing a more standardized list. A similar list has been developed for invention reporting.</p> <p>Preliminary work has begun on lists for awards, organization profiles, and individual profiles.</p> |

### Objective 1.2

Link data elements among agencies.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Map jointly determined data elements to agency policies and systems.  |
| <b>Required Actions:</b> | Analyze the joint data element dictionary against individual agency systems.  |
| <b>Responsibility:</b>   | All agencies, LMI   |
| <b>Action/Status:</b>    | ARO, the Department of Energy (DOE), the Department of Transportation (DOT), NIH, NSF, and ONR have all, at a minimum, evaluated the data element list to their internal systems. Most have begun active projects to link EDI to their systems. |

### Objective 1.3

Work toward establishing a common electronic telecommunications architecture.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Assess the use of the Internet, FACNET, and other telecommunication approaches to exchange electronic information.  |
| <b>Required Actions:</b> | Determine telecommunications architecture.  |
| <b>Responsibility:</b>   | EC Committee  |
| <b>Action/Status:</b>    | Testing is mostly being conducted through the Internet. While no formal analysis has been conducted, preliminary consideration would be to focus on the Internet. Most grant trading partners are more familiar with direct Internet connections, and this would also eliminate or minimize the requirement for VANs, thereby reducing the cost associated with EC. |

### Objective 1.4

Establish EDI and WWW as baseline technologies, but support additional approaches, including continued use of paper where it is necessary.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Use EDI and WWW as primary methodologies, but also offer the following: <ul style="list-style-type: none"> <li>◆ Continued support for the use of paper</li> <li>◆ Use of HTML as an alternative format to X12 to transmit data</li> <li>◆ Part EDI, part other (e.g., EDI and paper).</li> <li>◆ EDI merged with other electronic technology for enriched text—e.g., HTML, Standard Generalized Markup Language (SGML), Portable Document Format (PDF), external objects, and nontextual media).</li> </ul> |
| <b>Required Actions:</b> | Determine which approaches and time frame your trading partners can use. Document overall plan.  |
| <b>Responsibility:</b>   | Each individual agency.  |
| <b>Action/Status:</b>    | The BPWG established a policy in early 1996 that to the extent possible agencies should support both a WWW and EDI approach. As indicated in other objectives, extensive EDI development is under way. Development of a joint WWW site data dictionary was developed in late 1996. Initial planning has begun on how to develop this Web site.   |

## Objective 1.5

Obtain high-level policy and recognition of the federal support EC program.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Develop communication between our committee and other groups and federal organizations.  |
| <b>Required Actions:</b> | <p>Submit recommendations to and take direction from BPWG.</p> <p>Participate in the Federal Demonstration Partnership (FDP).</p> <p>Coordinate with other programs including the National Performance Review program, the Office of Science and Technology Policy (OSTP), and the Government Information Technology Services Board.</p>   |
| <b>Responsibility:</b>   | EC Committee   |
| <b>Status:</b>           | <p>The ECC has incorporated its work within the Federal Demonstration Partnership, including FDP working groups for organizational profiles, professional profiles, and electronic award notifications.</p> <p>DOT and DOE have also joined with other agencies to participate in the Government Information Technology Services (GiTS) Electronic Grants Intergovernmental Working Group.</p> <p>Through the IC development process the project has also become known to the procurement community and systems group. There has also been substantial trading partner outreach (see Chapter 9).</p> |

## Objective 1.6

Where EDI transaction sets will be a part of the EC strategy, standardize their use for all participants and follow usage established by the federal EC initiatives.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Use (modify) existing ICs, where necessary write new ones that support agreed-upon data usage, and submit them to the FESMCC. These ICs will provide the common definition of how we will use EDI transaction sets. |
| <b>Required Actions:</b> | Identify appropriate transactions sets as functional requirements are determined.   |
| <b>Responsibility:</b>   | ECC, LMI  |
| <b>Action/Status:</b>    | <p>Grant Application: New X12 transaction set and federal IC have been developed and approved.</p> <p>Grant Award: Using existing 850 transaction set and existing federal IC.</p>                                  |

|  |  |
|--|--|
|  | Invention Reporting: Used existing 870 transaction set and developed draft federal IC. |
|--|--|

### Objective 1.7

Establish standards for the presentation and functionality of common WWW interfaces and systems (e.g., status information).

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Develop coordination mechanisms to ensure interfaces for WWW systems.   |
| <b>Required Actions:</b> | Determine and agree on candidates for common systems.<br>Develop standards based on agreed priorities.  |
| <b>Responsibility:</b>   | EC Committee  |
| <b>Action/Status:</b>    | <p>The EC Committee has determined that there should be a single federal grant Web site for organizations to submit grants and access data. Whether there will then be links to agency sites or the links will be “behind the one site” has not yet been determined.</p> <p>A set of grant application data element characteristics has been developed that can be used for EDI, a WWW site, and HTML transmissions.</p> <p>The WWW subcommittee now has responsibility to begin implementation planning. Their initial planning is focusing on establishing security mechanisms. The Electronic Research Administration (NewERA Project) is also working on EDI security methods.</p> <p>Efforts that are in their beginning stages are organizational profiles, professional profiles, and electronic status.</p> |

## GOAL #2—ENSURE THAT EC IS IMPLEMENTED AND CONDUCTED IN A MANNER THAT USES FISCAL AND HUMAN RESOURCES EFFECTIVELY

### Objective 2.1

Minimize the data trading partners must submit, and maximize use of that data.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Share data across agencies and trading partners.  |
| <b>Required Actions:</b> | <p>Share a single electronic proposal submitted to multiple agencies.</p> <p>Require detailed budget data only when the application survives initial technical reviews.</p> <p>Establish an organization and personnel profile database of “basic” data that trading partners would update to cite data that would be the same across all applications.</p> <p>Encourage agencies, trading partners, and vendors to establish software that supports ECC-approved standards.</p>  |
| <b>Responsibility:</b>   | All agencies  |
| <b>Action/Status:</b>    | <p>To date, development and testing have focused on simply exchanging applications between trading partners. No work has yet been conducted on sharing a single grant application to multiple agencies or later transmission of just-in-time materials.</p> <p>Work has begun on concepts for organizational and professional profile databases.</p> <p>Commercial software firms are beginning to develop grants management software that will exchange data electronically with federal agencies. Several universities are also beginning to implement systems.</p> |

|               |
|---------------|
| Objective 2.2 |
|---------------|

Identify areas where EC can improve overall federal support business practices.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Maintain an EC common forum for sharing best practices.   |
| <b>Required Actions:</b> | Make recommendations to the BPWG and the GITS Board.  |
| <b>Responsibility:</b>   | EC Committee, FDP, GITS Board   |
| <b>Action/Status:</b>    | The ECC has been coordinating activities with a variety of cross-agency groups, including the BPWG, FDP, GITSB, FESMCC, and Treasury (for payment). |

|               |
|---------------|
| Objective 2.3 |
|---------------|

Work to enhance federal stewardship of resources.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Promote widest possible use of common EC processes throughout the federal support community.   |
| <b>Required Actions:</b> | <p>Efforts have been made in several distinct functional areas:</p> <ul style="list-style-type: none"> <li>◆ Evaluate preaward processes</li> <li>◆ Payment: Work with Treasury, the Defense Finance and Accounting Service (DFAS), etc., to develop compatible EFT payment processes</li> <li>◆ Human resources: Develop strategies for better use of personnel and training.</li> </ul>  |
| <b>Responsibility:</b>   | EC Committee   |
| <b>Status:</b>           | <p>DOE and NIH have supported an NSF lead benchmark study to generate baseline data on the cost and perceptions related to preaward processes with universities and nonprofit research organizations. NASA has conducted a user survey of the peer review processes.</p> <p>The NewERA Project is preparing a report on the impact of ERA upon grantee personnel.</p> <p>DoD activities are moving toward working a common payment system using the Navy's STAR system. No other combined payment work has been initiated.</p> |

## GOAL #3—IMPROVE INFORMATION SHARING AMONG EC PARTICIPANTS

### Objective 3.1

Perform implementation testing and provide supporting demonstrations for newly developed standards.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Perform testing with trading partners and other agencies.  |
| <b>Required Actions:</b> | Perform standards testing between each agency and trading partners.  |
| <b>Responsibility:</b>   | Each individual agency   |
| <b>Action/Status:</b>    | Testing of the 194 is being coordinated through the NewERA effort, using the federal IC as the baseline. DOE, NIH, and ONR are working with a small group of trading partners. NSF will begin testing in the fall of 1997. ONR will begin testing the 850 Grant Award transaction set in the summer of 1997. |

### Objective 3.2

Exchange federal support information.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Provide capability to share grant-related data among agencies.   |
| <b>Required Actions:</b> | Implement methods for sending and receiving proposal data among individual agencies.   |
| <b>Responsibility:</b>   | ECC, individual agencies   |
| <b>Action/Status:</b>    | Initiatives have begun to evaluate development of access to organizational and professional profiles, status data, and a joint WWW site. |

## Objective 3.3

Simplify means for agencies and trading partners to share status data.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Establish automated means of providing status.   |
| <b>Required Actions:</b> | Create an on-line or interactive status database. Explore potential EDI transaction sets.  |
| <b>Responsibility:</b>   | EC Committee   |
| <b>Action/Status</b>     | NSF has this capability, and NIH is piloting it. Development within EDI and WWW approaches will follow establishing the initial capability to exchange data. |

## Objective 3.4

Coordinate intra- and interagency communications for grant and other agency business functions.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Coordinate with other federal EC initiatives.  |
| <b>Required Actions:</b> | Participate in FESMCC, FDP, and GITSB processes.   |
| <b>Responsibility:</b>   | EC Committee, each individual agency   |
| <b>Action/Status</b>     | Information sharing has been conducted through any number of forums, including the FDP and the FESMCC. |

## Objective 3.5

Establish agency commitments.

|                          |   |
|--------------------------|---|
| <b>Strategy:</b>         | Agencies should establish a time frame for business process review, defining data requirements, testing, and developing implementation guides.  |
| <b>Required Actions:</b> | Develop agency plans for grants EC.   |
| <b>Responsibility:</b>   | Each individual agency  |
| <b>Action/Status:</b>    | ARO, DOE, DOT, NIH, NSF, and ONR are all undertaking system development and testing to implement various aspects of grants EC, although no formal management plans have been published. |

|               |
|---------------|
| Objective 3.6 |
|---------------|

Promote trading partner involvement.

|                          |  |
|--------------------------|--|
| <b>Strategy:</b>         | Establish a trading partner outreach program.  |
| <b>Required Actions:</b> | Create a trading partner package that includes agency implementation guides and other documentation as needed. |
| <b>Responsibility:</b>   | EC Committee, each individual agency   |
| <b>Action/Status:</b>    | DOE, NIH, NSF, and ONR have developed draft user documentation for the grant application.                      |

## Chapter 5

## Establish Project Organization

---

To succeed in implementing electronic commerce for grants, we must treat it as a project: establish an organization, assign tasks and milestones, and monitor progress. However, a project of this size, involving numerous federal agencies and diverse trading partners, must also be flexible and provide for varying rates of implementation. Because of this, tasks affecting overall implementation will be assigned a single milestone, while other tasks affecting individual organizations will carry separate milestones for each participant. In these latter tasks the specifics of the approach will likely vary among agencies.<sup>5</sup> Lastly, like any project, grants EC will be dynamic and change over time. Our planning method must account for adjusting project goals and schedules based on changes in technology, federal policy, budgets, staff, and other factors.

In this chapter we will define our organization to manage implementation. In the following chapters we will define major areas of effort and identify some specific tasks within each.

### ORGANIZATION

Our EC Committee will oversee the planning, coordination, communication, and overall direction of implementation. The committee will look to the Business Practices Working Group for major direction in matching EC capabilities with the BPWG's efforts to reengineer processes. We will also provide the group with status reports, presentations, and recommendations where we believe EC can improve grants administration business processes. We also develop our pilot efforts in coordination with our trading partners under the aegis of the FDP and coordinate with the GITSB electronic grants initiative and other federal technical initiatives.

#### EC Committee

The EC Committee will work with other government agencies, cross-agency groups, and our trading partners. For most issues—such as those involving all agencies requiring immediate and broad-based input—it will manage the project as a committee of the whole. Such issues include the following:

- ◆ Policy
- ◆ Review and approval of transaction sets
- ◆ Strategic plan
- ◆ Committee objectives and budget priorities.

---

<sup>5</sup> For example, approving the grant application implementation convention is a joint effort, with everyone participating simultaneously and with a single milestone schedule. However, selecting EDI translation software is an agency-by-agency choice with varying schedules.

However, we will establish subgroups as needed. Currently, we have subgroups of sponsoring agencies and assigned or volunteering individuals.

## Sponsoring Agencies

Projects relating to certain technologies, processes, or types of information would be the responsibility of one or more lead agencies, which would coordinate the project operation and funding, and report findings and progress to the EC Committee.

For example, the following will be among the initial projects and sponsoring agencies:

- ♦ Electronic Research Administration (NewERA Project)—The Department of Energy is leading this with participation from AFOSR, NIH, ONR, and several trading partners.
- ♦ Invention Reporting—National Institutes of Health
- ♦ Award Notification—Federal Demonstration Partnership
- ♦ Organizational Profiles—Federal Demonstration Partnership
- ♦ Professional Profile Prototype—Federal Demonstration Partnership
- ♦ Common Security for accessing agency WWW sites and services—A WWW subcommittee of the ECC, including NIH, NSF, and ONR
- ♦ Security standards for EDI transmissions—NewERA Project
- ♦ EDI/EFT Project—ONR and Treasury.

## MANAGEMENT TOOLS

This project plan is our primary tool for communicating and documenting our goals and plans. It will be reviewed and revised periodically. We will also maintain the project milestone schedule on a PC-based tool.

### Publish and Revise This Plan

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Update and publish this plan as needed.                                 |
| <b>Responsibility:</b>   | LMI, EC Committee   |
| <b>Action/Status:</b>    | First publication: May 1996.<br>Second publication (current): May 1997. |

## Maintain Project Schedule

|                          |                                    |
|--------------------------|------------------------------------|
| <b>Required Actions:</b> | Update project schedule as needed. |
| <b>Responsibility:</b>   | LMI, EC Committee                  |
| <b>Action/Status:</b>    | See Appendix B.                    |



## Chapter 6 Identify Functional Requirements

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One major area of effort will be for organizations to identify their functional requirements. In the context of grants EC, that means determining how to manage the grants administration process more effectively and efficiently. Specifically it includes how to use electronic grants to replace paper-based processes.

This effort encompasses a wide range of possibilities. At one end of the spectrum, a federal agency could simply print the received data and then continue to process it in the traditional paper mode. At the other end of the spectrum, an agency could launch a major business practice reengineering effort—which will result in greater savings and efficiencies, but also requires investment dollars and organizational energy. Each organization must determine its individual goals and capabilities.

### BUSINESS PROCESS REENGINEERING GOALS

Ideally, each organization will capitalize on the federal support EC project to reengineer at least to some extent. Reengineering should begin with broad organizational goals such as

*We will reduce the time required to process a grant application through to either rejection or award, while at the same time reducing our cost to process the application.*

or

*We will reduce the burden placed upon the applicants in preparing an application.*

Many of these goals or more detailed objectives under the goals may not be EC-based. For example, one means for reducing the burden upon applicants would be to eliminate the inclusion of a detailed budget in the initial proposal. Only those proposals that have sufficient scientific merit, focus, etc., would follow up with a detailed budget. *EC should not be a goal in and of itself; rather it should be just another tool in the reengineering toolbox.* Equally, however, electronic data is the driver in eliminating the large costs and delays brought on by paper-based actions such as data entry, reproduction, and filing.

While the above paragraphs use research grant applications to illustrate reengineering concepts, they apply to all phases of the grants administration cycle: presolicitation; application, evaluation, and award; postaward administration; and closeout. They apply to both research grants as well as all other types. Most important, reengineering should be performed on both sides of the partnership. Just as for federal agencies, applicants can better contain costs and make use of their grants data through reengineering.

### REENGINEERING ACTIONS

Once overall agency goals are developed, they must be turned into an action plan. Large reengineering efforts will require teams to develop the new process; revise proce-

dures; retrain people and revise documentation; develop major application programming; consider possible hardware acquisition; identify possible major agency policy changes; and a myriad of other actions.

Determining organization functional requirements is done on the basis of an individual organization. Consequently, organizations must develop independent plans and milestones. However, there are numerous common attributes to preparing grant applications and performing the work on the trading partner side, and in initiating, evaluating, awarding, and administering grants on the agency side. Sharing ideas, information, expertise, and experience across organizations will benefit everyone. Sharing can extend beyond information. Software and hardware can also be shared either among organizations involved in grants or among EC-supported business functions in the same organization.

One of the key outcomes of determining functional requirements is the data to be used by the organization, including the data to be exchanged with trading partners. *Data exchange is both an agency-by-agency and a joint issue.* The EC Committee has already begun to address this issue based on current agency capabilities by developing a joint research grant application data dictionary and implementation convention. We are also proceeding to data requirements for other exchanges in the procurement area (see Chapter 7). We must recognize that these joint requirements may change as agencies proceed down the reengineering road.

## JOINT FUNCTIONAL REQUIREMENTS

### Organization and Professional Profiles

Some reengineering of the process will be on a joint basis. The ECC is working with the FDP to explore establishing a central database for a standard organization profile. This database would include address, required identification numbers, representations and certifications, and other information that is relatively static, but yet is typically required on every application. In the new environment, organizations would update this information only as it changes, and federal agencies reviewing applications would download it as needed. To date a draft list of data elements and a white paper reviewing some of the technical options (see Appendix E - Federal Support Electronic Commerce Committee) has been developed. Similar work is being initiated through the FDP for professional profiles. A potential list of data elements is being circulated within the trading partner community.

### World Wide Web Site

The BPWG and the ECC are committed to draft a single Web site where all trading partners can obtain grant information and exchange data (individual agencies will also maintain individual sites). The ECC has initially focused on the submission of grant applications. This capability will be primarily for smaller trading partners with a comparatively low level of grant activity.

The ECC has developed a data element dictionary and has established a Web subcommittee to begin work on the page.

## Invention Reporting

NIH has developed an application, Edison, to record invention reporting disclosures. This is a subeffort of the federal support EC effort and will incorporate other organizations' requirements into the system. NIH has already made agreements with NSF and the Environmental Protection Agency (EPA) to support their invention reporting data collection.

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Create a joint invention reporting dictionary.                  |
| <b>Responsibility:</b>   | All—NIH will lead.  |
| <b>Action/Status:</b>    | The system is operational and may be accessed via the Internet. |

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Map dictionary to transaction set and develop IC.   |
| <b>Responsibility:</b>   | LMI   |
| <b>Status:</b>           | A draft EDI IC using the 870 transaction set was submitted to the Federal Procurement Working Group in February 1997. |

## Future Joint Efforts

These efforts may be extended to other joint efforts in the future.



## Chapter 7

## Complete Operating Concept

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This part of our project plan presents an operating concept for implementing EC in grants administration. It will briefly describe our methods for using both EDI and the WWW as means to exchange data. It will also touch on some other approaches and issues such as communications and security.

EDI will be most advantageous to institutions who manage a significant number of grant applications and awards. These are institutions that typically will have some form of database that assists in writing and organizing a grant application or monitoring awards. EDI will allow these institutions to exchange grant data without rekeying data or undertaking manual operations to transfer the data. The WWW will be most convenient for organizations with smaller internal grants administration systems and who simply want to quickly develop and transmit a proposal. The next two sections will describe both techniques.

### EDI APPROACH

The sections below identify the basic components of an EDI system: a database, software to extract or load the data, and translation software.

#### Application Database

Central to effective use of EDI is that each trading partner possess some form of database or collection of programs that maintains the relevant data. Grants administration can be divided into the following functions: solicitation, application (proposal) generation, award, postaward tracking, payment, finance, and closeout. A trading partner may develop EDI capabilities for one or more of these functions (it is *not* necessary to support all of them).

Such a database *does not exist for exchanging EDI*. A database should be the means for the organization to internally manage one or more portions of the grant life cycle. EDI should be a byproduct of the value of the system to the organization.

These databases may be large or small and operate on any of the three traditional hardware tiers: mainframe, midsize computer, or PC. Many trading partners are developing their own systems, but several commercial grants management software systems are also available.

Whatever their technical or functional base, they must contain the data elements necessary to exchange a given transaction (grant proposal, award, etc.) with the federal agency. The means to extract the data from the database and begin its movement towards the federal agency are typically called “interface programs.”

## Interface Programs

Interface programs are usually custom software that extracts (or loads) data from the database, collects it, and formats it for the EDI translation software. For example, for a trading partner to prepare an application, the software would extract the relevant base data, budget, staff, research plan, etc., from the database and format it to be transmitted. For an incoming award it would do the reverse: receive the EDI data from the government and load it into the database. Interface software can range from a very simple “formatter” to complex routing and editing systems.

## Translation Software

EDI translation software represents perhaps the most unusual aspect of EDI operations. This software converts data between agency-specific file formats and the national EDI standard format (X12), which is used to communicate between trading partners. Translation software is readily available commercially. Packages vary immensely in terms of the hardware and operating system supported, throughput capacity, features, and cost, so it is important for each agency to shop for the most appropriate one. However, in many cases, especially for larger universities, translation software may already be on site.

Like any other form of EC there must also be some form of telecommunications path to the recipient. The EDI translation software is usually integrated with the path and handles communications sessions automatically.

## Leveraging EDI Operations

The effort to exchange grants data via EDI clearly involves work and cost. But grants EDI will not be done in isolation. For example, federal agencies will also be using EDI for procurement. The Treasury Department and the Defense Finance and Accounting Service are both developing EDI projects to process financial data.

Not only is the federal government committed to EDI, but so are many universities. As of fall 1994 nearly 600 institutions of higher education and secondary schools were participating in the SPEEDE/ExPRESS<sup>6</sup> program to exchange student transcripts via EDI. Universities and colleges also use EDI to exchange student loan data, make purchases, receive invoices, pay bills, and other activities (see Appendix C for a more complete description of university EDI activities.)

As EDI is leveraged across more business operations, the overhead expenses drop proportionally. So check with your institution's automated data processing (ADP) department to determine what your current EDI capabilities are.

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<sup>6</sup> Standardization of Postsecondary Education Electronic Data Exchange/Exchange of Permanent Records Electronically for Students and Schools.

# THE INTERNET

As we described in Chapter 2, the Internet is the linking of a vast net of computers through multiple communications lines and standard protocols and procedures. One part of the Internet is the WWW which provides the means for organizations to display data and for others to query and retrieve that data. The WWW can also be used to input data. This section looks at both the WWW, and the Internet in general for grant operations.

## World Wide Web

The World Wide Web provides a vast resource to display and exchange data for grants. It is very easy to access. In most cases one needs only a PC with a modem, Windows operating system, browser software, and access to an Internet service provider.

Once the federal agencies have developed the necessary home pages and supporting applications, the WWW will allow users with minimal capabilities to enter grant applications. However, unlike EDI (or HTML transfer described below), this data will not flow directly from a submitter's system, but rather must be manually entered. The WWW site should be most advantageous to organizations without internal grants databases.

NSF has developed computer programs to allow users to input a research grant application using the WWW (the FastLane project, described in more detail in Chapter 8). Similarly NIH is using the Internet to support its Edison project, which allows organizations to report inventions and patents resulting from work supported by NIH grants (see Chapter 8 for more details.)

The ECC will develop a WWW page to disseminate grant information and serve as a conduit for exchanging data. In the latter case at least two specific approaches are being considered:

- ♦ One will be to have the primary Web site exist as a locator. It will provide hyper-text links to specific agency sites where the actual entry of data will be performed.
- ♦ The other primary option will be to use the one site as the location to identify the receiving agencies and enter the data, then transmit the data to the appropriate agency via EDI, HTML, or other means.

A federal grants Web site could serve many functions, including the following:

- ♦ Display available grant opportunities<sup>7</sup>
- ♦ Submit a grant application to one or more agencies
- ♦ Submit organization or professional detail
- ♦ Submit follow-up reporting
- ♦ Provide access to the status of an application

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<sup>7</sup> One of the powers of the WWW is that information locations can be linked so users can obtain more information on a given or related subject. (See Appendix E for a list of agency home pages.)

- ◆ Display points of contact for information and assistance
- ◆ Announce awards and accomplishments.

## The Internet as a Communications Network

Aside from the WWW, the Internet's capacity as a telecommunications network can also be used. It offers an inexpensive telecommunications path without the necessity of VAN services. In the past most commercial firms have not used the Internet for high-value business transactions due to having little control over how the message was routed or how fast it would travel, and the difficulty in applying security. However, these circumstances are changing.

The Internet as a communications path can use many different protocols to transmit data, and EDI transactions can easily be exchanged over the Internet. The NewERA project is using the Internet to pass EDI transactions and later in 1997 will pass secure transactions.

NIH is also piloting using the Internet to transmit in HTML format. This approach more resembles the EDI approach than the WWW. The institution would have a grants database system and write programs to create the HTML files, and the receiving federal agency would also have to develop programs to translate the HTML files into their system. The primary differences from typical EDI in this approach are the elimination of EDI translators and the format of the data being transmitted.

## Combining EDI and the WWW

EDI and Internet technologies can also be combined in several ways. As described above the Internet can clearly be the telecommunications path to carry EDI transaction sets. HTML-formatted data can be carried in an EDI transaction set (e.g., 841 – Specifications/Technical Information transaction set) to convey technical data associated with a 194 Grant or Assistance Application transaction set. There are also applications that would allow a user to access a federal Web site through a browser and pull down an Internet program script (e.g., a Java “applet”) that would generate on the user's computer a grant application input form. When the application is complete, the program would automatically generate the EDI transaction. This approach would allow users with no EDI capability to effectively participate.

## OTHER EC TECHNOLOGIES

Many other less standardized approaches to EC are already being used by federal agencies and trading partners. In many cases the trading partner logs onto an agency computer and enters data. Another technique is for an agency to mail a PC-based application to a trading partner; the trading partner runs the program, enters the required data,

and returns the program by mail to the agency. These approaches typically require the re-entry of data already in trading partner computers and possess other drawbacks, but they are still an improvement over the exchange of paper.

## CONTINUED USE OF PAPER

For many trading partners with fewer resources or technical capabilities, or which have little annual activity, paper may still be the medium of choice for an indefinite period. Federal transition to EC for grants administration will be continuous and will continue to support all segments of the trading partner community.

## TELECOMMUNICATIONS STRATEGIES

Regardless of the specific approaches to EC, strong telecommunications capabilities will be a requirement. There are numerous means of communicating electronic data, including the “worst case” of downloading data onto a floppy disk and giving it to the U.S. Postal Service. However, two approaches are more likely than others. The first is to use the Internet as the telecommunications path for EDI transactions, HTML exchanges, or access to the Web via a browser. The other approach is to use FACNET.

### Using the Internet

The Internet offers “direct point-to-point” communications with trading partners. This option has appeal to research grant trading partners because they are familiar with the Internet, and it may reduce communications costs and the expense of a VAN.<sup>8</sup> Another strategy would be for grant-awarding agencies and trading partners to establish their own commercial, university, or government network entry point (NEP) or VAN to support all grant EC operations. The University of Texas is providing VAN-like services for SPEEDE/ExPRESS.

### FACNET

Congress established FACNET in the Federal Acquisition Streamlining Act of 1994 to support the movement of procurement transactions via EDI, including solicitations, receipt of quotes, awards, follow-up modifications and status, and payment. FACNET is to provide all federal agencies with the following:

- ♦ A backbone telecommunications network to transmit their transactions.
- ♦ EDI gateways to route, archive, and translate transactions.

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<sup>8</sup> Use of the Internet and VANs is not mutually exclusive. The FACNET entry points can communicate with the certified VANs via the Internet, and several VANs offer Internet connections to their customers.

- ♦ Network entry points to distribute transactions to VANs<sup>9</sup>.
- ♦ Single-point registration for nongovernmental organizations that wish to contract with any federal agency. This process is electronic and uses a central registration data bank.

A key point of the FACNET approach is for the commercial VANs to display federal requests for quotations (RFQs) on an electronic bulletin board. These bulletin boards can sort the RFQs by commodity or service, geographic area, originating agency, and a variety of other factors. Such capabilities enable vendors to conveniently identify solicitations that they can effectively respond to.

## SECURITY ISSUES

Adequate security measures must be applied to protect the data and verify its authenticity. Security, of course, means not only safeguarding against hacking and other forms of deliberate damage to the data, but also protection against system failures, natural disasters, and other accidents. Among the protections, we must ensure that

- ♦ the transaction originated from both the proper source and an authorized individual;
- ♦ transmissions are not copied or interfered with en route—a particular concern on the Internet, as the message may travel through several host computers as well as the communications line;
- ♦ transmissions reach the proper receiving application and are appropriately logged and acknowledged;
- ♦ data are archived in a safe and secure manner while stored in the computers; and
- ♦ privacy of sensitive data is maintained both in transit and while in government databases.

Many of the strongest security solutions require the same encryption or other approach on both sides of the transmission. This is costly and complex to implement in a diverse trading partner environment. Different approaches to security will be researched, evaluated, and reviewed among the agencies and with the trading partners before any specific approach is implemented.

Security is an issue for both the Internet and traditional EDI. The NewERA project has been awarded funding through the Interagency Working Group on Cryptology Policy to test security approaches for transmitting grant applications via EDI. The WWW subcommittee of the ECC is reviewing security as the first issue in developing a grants Web page.

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<sup>9</sup> VANs provide mailbox services (storage and forwarding), routing, archiving, and a variety of other services to commercial organizations with EDI programs. On the government side, the combination of gateways and NEPs performs similar functions for federal organizations.

## DESIGNING AND IMPLEMENTING THE OPERATING CONCEPT

The options described above, and perhaps others, must be investigated and decisions must be made. Part of the investigation must consider the relationship of the grants EC program with the overall agency EC process. Another aspect of the decision-making process is that some actions, like developing interface programs and obtaining translation software, are agency-specific, while others, such as telecommunications strategy, tend to affect the overall trading partner community; benefits will be gained by standardization. The tables below identify a few of the more significant tasks.

The ECC and its trading partners must continually evaluate the value of new EC technologies and capabilities while at the same time implementing a measured approach that will not result in the costs and disruption associated with “technology churn.”

### Determine Operating Requirements

|                          |  |
|--------------------------|--|
| <b>Required Actions:</b> | Identify specific hardware, software, telecommunications, facility, and manpower requirements.   |
| <b>Responsibility:</b>   | Each individual agency and trading partner   |
| <b>Action/Status:</b>    | DoE, DoT, NIH, NSF, and ONR have developed basic approaches for implementing pilot EDI programs. |

### Hardware Specifications

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Determine the hardware required to support planned EC applications. |
| <b>Responsibility:</b>   | Each individual agency and trading partner                          |
| <b>Action/Status:</b>    | See above   |

### EDI Translation Software Requirements

|                          |  |
|--------------------------|--|
| <b>Required Actions:</b> | Select EDI translation software based on a number of considerations, including final operating concepts, functional requirements, and hardware capabilities. |
| <b>Responsibility:</b>   | EC Committee; each individual agency and trading partner   |
| <b>Action/Status:</b>    | See above  |

## Telecommunications Strategy

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Develop a strategy for communicating with internal and external trading partners.                               |
| <b>Responsibility:</b>   | Each individual agency and university   |
| <b>Action/Status:</b>    | No formal analysis has been conducted, but all the EDI testing is being conducted directly through the Internet |

## Develop Security Approaches

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Identify specific means to ensure secure transmission and storage of sensitive data.                          |
| <b>Responsibility:</b>   | NewERA project, FDP, and WWW subcommittee of the ECC  |
| <b>Action/Status:</b>    | Testing of secure EDI transmissions will occur in summer of 1997. The WWW subcommittee has met several times. |

## Trading Partner Submission Format

|                          |  |
|--------------------------|--|
| <b>Required Actions:</b> | <p>Establish preferred and supported formats for transactions. Federal agencies will encourage EC, but there is no perceived date to stop using paper. The following options will continue to be offered to trading partners:</p> <ul style="list-style-type: none"> <li>◆ EDI as the primary methodology</li> <li>◆ HTML as alternative format to EDI</li> <li>◆ Part EDI, part other (e.g., paper)</li> <li>◆ EDI plus electronic technology for enriched text</li> <li>◆ Other electronic media such as the WWW.</li> </ul> |
| <b>Responsibility:</b>   | Each individual agency and university  |
| <b>Action/Status:</b>    | EDI is being actively tested by several agencies. A WWW site is in the initial planning stages, as are NIH tests of HTML transmissions.  |

# Chapter 8      Agency EC Implementation Initiatives

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Testing and implementation will be phased over several years, as federal agencies and trading partners individually obtain the resources to reengineer and establish EC programs. This chapter describes the plans for agencies that are establishing demonstration projects and testing and implementing EC within the next year.

## DEPARTMENT OF ENERGY

The overall approach to DOE project and procurement systems is described in Appendix A.

### Electronic Research Administration (NewERA Project)

Paper documents are bulky, fraught with errors, laborious to transport, difficult to manage, and costly to maintain. Research administration is awash in paper.

Acting upon the receptiveness of the university research community as established in an earlier feasibility study,<sup>9</sup> the Department of Energy's Energy Research office (ER/DOE) awarded a cooperative agreement in 1994 to RAMS-FIE, a technology company in Gaithersburg, MD, to coordinate an Electronic Research Administration NewERAdemonstration with university customers.

#### DEMONSTRATION CONCEPT

In NewERA the complete cycle of grant activity is automated for computer-to-computer information exchange. This includes all creation, transmission, and submission activity for proposal announcements, applications, award notification (or rejection), peer review, project accounting, and reporting.

The demonstration project, called NewERA, provides a means to test interagency standards developed within the Electronic Commerce Committee.

NewERA comprises three separate but related NewERA activities in preaward administration, postaward administration, and secure Internet commerce.

The initial cooperative agreement from ER/DOE focuses on transmitting grant applications electronically to agencies using a public standard. ONR, in 1995, awarded supplemental funds to NewERA to assist with the expansion of its NewERA effort in postaward administration for electronic funds transfer. Finally, beginning in 1997, the federal cryptography policy group awarded additional funds to leverage the use of the NewERA test-

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<sup>9</sup> Federal Information Exchange, 1994

bed for demonstrating secure transmissions over the Internet through the Emergency Access Demonstration Project (EADP).

The goal of NewERA is to demonstrate an open standards-based implementation of NewERA using EDI, E-mail, and Internet transaction security.

## NEWERA TESTING

NewERA participants are demonstrating the use of EDI and Internet electronic mail as enablers of NewERA for submitting and processing grant applications.

Currently four federal agencies are participating in this demonstration: DOE, NIH, ONR, and the Air Force Office of Scientific Research.

Participating grantee organizations, recognized in NewERA as "National Demonstration Centers for Electronic Research Administration," include Baylor College of Medicine, Duke University, Florida A&M University, Fred Hutchinson Cancer Research Institute, Massachusetts Institute of Technology, North Carolina State University/GAMS (Grant Application Management System, in partnership with IBM), Pennsylvania State University, University of California at Los Angeles, and the University of Notre Dame.

RAMS-FIE is charged with coordinating project activities with the demonstration centers and the agencies. Business and technical personnel participating in the project, generally three or four from each organization, form the membership of the NewERA Task Force. In addition, the Business Subcommittee and Programmers' Workgroup support NewERA efforts.

The Programmers' Workgroup is currently testing the transmission and receipt of transaction set 194. The success of the test plan rests on the foundation of control data. In most any experimentation (such as a clinical trial), it is necessary to establish a control group before administering an intervention to a test population. The control group provides a baseline for measuring change. Similarly, the success of NewERA, and the subsequent establishment of EDI in research administration, depends on control data. Control data will provide a reference, or baseline, for verifying system compliance and data validity among trading partners.

The 194 transaction set is directed toward the "forms" requirements for a grant application, typically including organizational, budget, personnel, and procedures data. It does not incorporate the research plan. Based on recommendations made from the Business Subcommittee, NewERA will test transmission of the research plan using PDF data embedded within the 841 transaction set. A plan similar to the 194 will be used to do proof of concept and interoperability testing.

In addition to the 194 and 841 transaction sets, NewERA will be testing Internet transaction security. The Interagency Working Group on Cryptology Policy, under EADP, is funding 10 programs; NewERA is one of them. Projects will demonstrate various methodologies and technologies for providing emergency access to encrypted data.

Within NewERA, demonstration sites will test emerging security technologies for EDI that are based on the Internet transport protocols for E-mail, the File Transfer Protocol (FTP), and the Hypertext Transfer Protocol (HTTP). The project will use commercial technologies from multiple vendors, using beta test versions of software that follow the emerging standards and interoperability requirements. Key components include the use of a public key-private key infrastructure for encryption, authentication, integrity, and non-repudiation.

## DEPARTMENT OF DEFENSE

### Army Medical Research and Materiel Command

The U.S. Army Medical Research and Materiel Command (USAMRMC) maintains Internet home pages that provide information about the Command's areas of scientific interest, ongoing projects and programs, synopses of current solicitations, and announcements of sources sought. Additionally, they contain information on EC/EDI, including registration information, EC/EDI fact sheets, and an EC/EDI handbook. They also provide the USAMRMC's Broad Agency Announcements (BAAs), with complete download capabilities, the associated proposal forms and instructions, and the capability to submit letters of intent on line.

### Army Research Office

Currently, the Army Research Office is systematically upgrading its corporate information system (CIS). This upgrade involves the transfer and replication of data from the current VAX mainframe to a local area network (LAN). ARO's LAN will be operating on a Novell server using Sybase as the CIS.

Presently, the ARO maintains a home page on the Internet. It provides a profile of the ARO's business environment and allows downloading of BAA and all of the associated proposal forms. These forms can be downloaded and filled out using various applications, such as Microsoft Word for Windows, Word for the Macintosh, or WordPerfect.

In 1996, using Tellink software and a stand-alone computer system, ARO verified the EDI proof of concept by successfully receiving the 194 transaction set and electronically acknowledging its receipt. Because the ARO continues to change and enhance its CIS, it has not decided which EDI architecture will support CIS. ARO's strategy is to continue exploring the government-wide advancements in the EDI environment and eventually incorporate the most appropriate and compatible architecture.

### Office of Naval Research

#### INTEGRATED NAVY RESEARCH INFORMATION SYSTEM

The Office of Naval Research has implemented a new Integrated Navy Research Information System (INRIS). A module for EDI communication of proposals, awards, administration, and payment data is planned for development by September 1997.

## ELECTRONIC PAYMENT SYSTEM

ONR is also implementing an EDI and EFT electronic payment system, which began as a joint project with the Navy Regional Finance Center in 1989. The Director of Defense Research and Administration has subsequently endorsed EDI and EFT for making payments at universities, because they reduce delays, improve the accuracy of financial data, and are flexible enough to process both contract and grant vouchers.

Two years of planning, design, and testing concluded successfully in 1991 with the launch of the phase 1 pilot program. Besides ONR and the newly established DFAS, it included the Massachusetts Institute of Technology (MIT) and the University of Southern California.

In 1994 phase 2 of the program progressed with expansion to all of ONR's field contract and grant administration offices, and the recruitment of six additional schools into the system: the California Institute of Technology, the University of Utah, Oregon State University, the University of California at San Diego, the University of Illinois at Urbana-Champaign, and the University of Southern California.

Phase 3 began in November 1995 with the goal of rapidly expanding to most of ONR's research performers. Still ongoing, this third phase has pushed participation in the system to 26 institutions and handles approximately 42 percent of ONR's funding to universities and nonprofit organizations.

Typical benefits of the EDI and EFT electronic payment system are automatic accounting and tracking of transactions, reduced clerical and handling time, and prompter payments. The time from voucher submission to receipt of payment has been reduced from an average of 60 or more days to about 5 days.

The voucher handling is a pure EDI (ANSI ASC X12) process, using the 810 Invoice, the 997 Remittance Advice, and the 820 Payment Notification. Communication is through commercial VANs. The electronic funds transfer is a National Automated Clearing House Association (NACHA) transaction that deposits funds into the payee's bank account.

## TESTING SCHEDULE FOR THE 194 TRANSACTION SET

As a signatory to the DOE cooperative agreement for demonstrating electronic research administration with universities, ONR has successfully received dummy proposals from Ohio State and North Carolina State using the 194 transaction set, and returned to them receipt acknowledgements using the 997 transaction set. As a member of the Federal Demonstration Partnership, ONR is also developing data elements for the electronic award using the 850 Award transaction set, and working with the above universities and MIT to map and translate these elements into campus and agency databases.

## DEPARTMENT OF HEALTH AND HUMAN SERVICES

The Department of Health and Human Services (DHHS) is committed to redesigning the way it transacts business with its many partners in the grants community. In 1994, DHHS established GrantsNet, an information service on the Internet, to make grant re-

sources easily accessible to the public, the grantee community, and grant-makers. This service provides information by accessing various information sources available to the grants community, such as DHHS grant regulations, public laws, executive orders, and OMB circulars. It includes links to other grant information Web sites across the Department.

In addition, DHHS is working with each of its operating divisions through an Electronic Grants Subgroup of the Executive Committee for Grants Administration and Policy (ECGAP) to disseminate information and discuss electronic grants issues. Its largest grant-making division, the National Institutes of Health, has taken the lead in implementing electronic commerce for transactions with the grantee community. Its work serves as the model for future electronic initiatives within the Department.

## The National Institutes of Health

### ELECTRONIC RESEARCH ADMINISTRATION INITIATIVES

The phenomenal advances and almost constant changes in information technology are being exploited at the NIH to improve stewardship of awards. The NIH has made a commitment in the design, development, and deployment of an Electronic Research Administration (ERA) system. This ERA system will greatly facilitate preparation of grant applications by research investigators, processing of applications by NIH staff, as well as management of awards by grantee organization and NIH staffs. The ERA system will eventually place the entire life cycle of grants administration business processes within a client-server common file database.

Using this database technology, NIH staff will be able to maintain timely, fully electronic communication with extramural grantee "business partners." The system will be made fully secure using state-of-the-art encryption methodology. By requiring a user to log onto the system, access will be limited to authorized applicants, awardees, and NIH staff, who could each review and add information as required.

The components of the ERA system that are undergoing pilot testing or have been fully deployed are summarized below.

#### *Electronic Submission of Competitive Grant Applications*

Under a Department of Energy Cooperative Agreement, the NIH and several DoD agencies are participating in a pilot study to test a new system for the submission of grant application information. These agencies and 10 research institutions will test EDI transmission of data standards developed collaboratively by the federal agencies. Key administrative information in grant applications will be submitted directly into NIH's database, without intervening paper copies or rekeying of data. This pilot implementation will continue through spring 1997 and will be expanded in 1998 to include more aspects of the applications and more grantee organizations until full implementation can be achieved.

Similarly, NIH, in collaboration with other members of the Electronic Commerce Committee, is testing the submission of grant application information in HTML format. This data stream is based on the EDI standard but provides institutions with an alternative for translating the data.

### *Electronic Streamlined Noncompeting Award Process*

In FY95 NIH instituted a simplified noncompeting award process for noncompeting continuation awards included in the Expanded Authorities (EAs) or Federal Demonstration Partnership. A natural next step and enhancement to the simplified process is being pilot-tested: the Electronic Streamlined Noncompeting Award Process, or e-SNAP, an interactive World Wide Web site for electronic submission of the information. Using the interface, authorized principal investigators will prepare electronically all the required information, and then the grantee organization administrative officials will approve the submission to NIH to initiate the noncompeting award process. Upon receipt of the submission, NIH staff will evaluate the electronic materials and, if approved, generate an electronic notice of grant award back to the grantee. The pilot implementation of the electronic process began in December 1996 with eight grantee organizations. Full implementation for all eligible EA/FDP grants is expected by the end of FY97.

### *Application Status System*

One of the obvious benefits of electronic communication is the ability to exchange time-sensitive information in a timely manner. In the first phase of the pilot test of status information, authorized users will log onto a secure Web site where they can review the preaward status, including arrival of the application at NIH, assignment for review, dates of review, review score, critique, Advisory Council meeting dates, and, if successful, likely award date. Grantee organization officials will be able to view pending actions for all applications originating from their organization. This will offer improved administration within the grantee organization.

The second phase, to follow near the end of FY97, will not only provide status feedback but also enable research investigators to update their biographical information (professional profile, including curriculum vitae), as well as grantee organization officials to update the organizational contact information (organizational profile, including administrative officials and financial, assurance, and certification information). These actions will preclude rekeying of such information for each application, as must now be done with paper submissions.

### *Edison Invention Reporting*

The Edison system is designed to receive, store, sort, and report information about inventions, patents, and licenses that have resulted from NIH funding agreements. The system is now in production, with 40 grantee organizations authorized to report such information. Additional organizations continue to participate, and all grantee organizations are encouraged to explore the Edison home page (<http://era.info.nih.gov/Edison/>). Edison uses a World Wide Web interface in a client-server architecture whereby authorized grantee organizations and NIH staff can access a shared relational database. By using a browser that supports secure socket layer standards (e.g., Netscape or Microsoft Internet Explorer), grantees are able to send their information in a fully secured electronic environment. Data can be viewed and modified in real time in an interactive setting. An additional version of Edison has been designed to simplify submission of invention information for grantee organizations with resident databases.

Rather than requiring these organizations to rekey information into Edison via the Web browser, the NIH has developed software called "Internet Talkers". The software, which is available free for use on all platforms, enables computer-to-computer transfer of data.

As a result of interagency cooperation and collaboration, most of the federal agencies with invention reporting requirements—such as DoD, the U.S. Department of Agriculture (USDA), NSF, DOE, and the U.S. Agency for International Development)—will be using Edison as the common interface to government invention reporting in the near future. Further efforts to this end involve elaboration of the Edison data elements to become a federally approved EDI implementation convention using the ASC X12 870 transaction set.

Many features of the user-friendly Edison prototype—such as differential access to data, electronic security, and establishing test accounts to try out the system—are being incorporated into other ERA projects under development, such as e-SNAP and the status system.

#### *CRISP on the Web*

NIH has undertaken a broad-based effort, primarily through its home page, to make information pertaining to NIH grant programs available electronically. One major component of this effort is CRISP—Computer Retrieval of Information on Scientific Projects. The existing NIH grants electronic database is a collection of information that spans nearly 25 years. This wealth of information on awarded grants and contracts is currently made available for searching by the public on the NIH home page via CRISP. As part of the ERA initiative, a Web-based interface will be improved to allow full text searching of research project abstracts and grantee organization information. This will dramatically improve retrieval of the most relevant information to facilitate inquiries by researchers, provide useful orientation for the public, and respond more efficiently to inquiries from other agencies and Congress.

A pilot test for NIH staff on the new CRISP Web interface began in February 1997. Full deployment to the public should follow late in 1997.

#### ELECTRONIC REPORTING OF TRAINEE APPOINTMENTS

NIH has developed an interface for collecting trainee appointment information. The system is a Web interface through which a user can enter information about trainees appointed to a National Research Service Award (NRSA) Institutional Research Training Grant. This system will replace the printed Statement of Appointment Form 2271. Several institutions, including the 10 DOE cooperative agreement demonstration centers, are participating in a pilot project. It is anticipated that this system of reporting will be expanded to additional grantee users in the summer of 1997.

## DEPARTMENT OF THE TREASURY, FINANCIAL MANAGEMENT SERVICE

### Grants Management Project

The Financial Management Service (FMS) plans to conduct a pilot test of several recommendations designed to streamline and standardize two subprocesses of the grants management process. These target areas are the notification of award and supplemental award processes. Specific recommendations include notifying states of a grant award electronically via E-mail and Internet, or through some other on-line system. In conjunction with partner state and federal agencies, FMS conducted research in these two areas. Its findings will lead to further recommendations for improving the subprocesses.

### Automated Standard Application for Payments

The Automated Standard Application for Payments (ASAP), a payment and information system jointly developed by FMS and the Federal Reserve Bank of Richmond, began implementation in August 1995. ASAP is an all-electronic system for the request and delivery of funds for federal domestic assistance programs, an arena encompassing transfers of \$300 billion a year. After a one-time enrollment in ASAP, states and other recipients can directly request and receive agency preauthorized funds through the U.S. Treasury. The Federal Reserve Bank of Richmond, as the service provider for ASAP, performs system development, operations, and maintenance functions.

Current federal users include the Food and Consumer Service (FCS) of the USDA, the Environmental Protection Agency, the National Science Foundation, the Department of Energy, the Social Security Administration, the Office of Civilian Health and Medical Programs of the Uniformed Services (OCHAMPUS), and the Health Care Financing Administration (HCFA). Current ASAP recipient organizations include governmental offices of all 50 states and 6 U.S. territories, Indian Tribal Organizations, institutions of higher education, and processors for several electronic benefits transfer (EBT) programs. Ultimately ASAP aims to become a one-stop connection between federal agencies and recipient organizations for the request and delivery of federal funds.

### Working Relationship with Health and Human Services

FMS, which operates ASAP, and the Department of Health and Human Services, which operates the Payment Management System (PMS), are working together to improve federal grants management by improving the payment process. At present, the agencies are assessing the feasibility of integrating their grant payment systems. The integrated system would facilitate a common payment process for all grant recipients.

## NATIONAL SCIENCE FOUNDATION

In FY94, NSF started a 3-year experimental project to explore methods to redesign and streamline the way it does business with the research, education, and related communities. The collection of pilot projects, called FastLane, continues NSF's long-standing emphasis on reducing the administrative burden on its staff and institutions, and improving processes through the use of technology. Processes that will be improved by FastLane include the preparation and submission of proposals, reviews, final project reports, annual project reports, proposal and award status inquiries, and cash transaction requests. The goal is to create a paperless and electronic process ("Electronic Proposal/Grant Jacket") that would encompass the entire grant operation, including grant administration and financial management.

The FastLane project automates the full gamut of research administration activities, including announcements of funding opportunities, submission of proposals, proposal review, award announcements, postaward administration of the awards, financial transfers, and dissemination of the research to other researchers and the general public. World Wide Web servers and browsers provide on-line access to NSF systems. Institutions will be able to interact with NSF using both on-line and batch (EDI) transactions. For instance, an institution could submit a request for a no-cost extension using an interactive system, or it could send an EDI transaction via the on-line system.

Over 480 institutions are currently participating in the FastLane program. They include a diverse group of grantee institutions with representatives from major universities, small colleges (including historically black institutions), community colleges, and non-profit organizations. Over 80 percent of NSF proposals are received from these institutions, and a comparable proportion of awards are made to them. Testing of new modules is coordinated through a group of 16 universities, which will be enlarged to include all of the FDP institutions in FY97.

Improvements scheduled for implementation in FY97 and FY98 include EDI submission of proposals, a redesigned project reporting system, panel review of proposals, information dissemination, and expansion of the electronic jacket. NSF will continue to develop baseline measures and assess performance results. Collaboration with other federal grants agencies will continue with the implementation of common security, institutional profile, and professional profile systems.



## Chapter 9

## Trading Partner Outreach

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The grants EC partnership cannot succeed without the full and earnest support of trading partners. The trading partner community includes institutions of higher education; state and local governments; and other participants in research, block, formula, discretionary, and other forms of grants and assistance. To obtain this level of support, the EC process must be understood to benefit the recipients as well as the federal agencies. Our intentions and plans must also be clearly understood by our trading partners. The Federal Demonstration Partnership will be the principal, official forum for business process reengineering and the testing of prototype and pilot EC components. We need to continually communicate all of the following:

- ♦ Testing requirements and procedures
- ♦ Why federal agencies must move away from the present paper-based processes
- ♦ That EC is not just cost containment, but also brings new capabilities and improved performance
- ♦ That EC and process reengineering will require an investment cost by the recipients, but it will also bring long-term savings and make them more efficient in pursuing grant opportunities
- ♦ That investment and operating costs can be distributed across business functions
- ♦ That the recipient community will be fully involved in designing, testing, and implementing EC solutions
- ♦ That the transition will be methodical and will support not only organizations that desire to move quickly, but also those less able to do so
- ♦ Current project status, future plans, successes, and obstacles. Information sharing by those in the lead for planning, testing, and implementation will be crucial to smoothing the path for those who follow.

Trading partner outreach began in 1994 with several presentations, including the National Council of University Research Administrators (NCURA), the Society of Research Administration (SRA), Council on Government Relations (COGR), and the National Grants Management Association (NGMA). University and research organizations participating in the NewERA demonstration received briefings and training in February, April, and July 1995.

The outreach effort has continued through the NewERA project and the other organizations.

The SRA has held a series of briefings on EC, including ones in July 1996 and January 1997, with another planned for July 1997 in Chicago. The December 1996 FDP and March 1997 NCURA meetings both featured EC in grants administration.

In 1997 we will also begin developing a more formal trading partner outreach program as identified in the task boxes that follow.

## TRADING PARTNER IMPLEMENTATION STRATEGY

|                          |  |
|--------------------------|--|
| <b>Required Actions:</b> | Formulate a strategy for soliciting and working with trading partners. The strategy should include development of an information package and procedures for trading partner participation. |
| <b>Responsibility:</b>   | ECC trading partner subgroup, university demonstration participants  |
| <b>Status:</b>           | Solicitation is occurring through meetings of SRA, NCURA, COGR, NGMA, etc., and through informal contacts and one-on-one discussions.  |

## TRADING PARTNER INFORMATION PACKAGE

|                          |   |
|--------------------------|---|
| <b>Required Actions:</b> | Prepare an information package for all prospective trading partners. The package contains such information as agency implementation guides, operating concepts, passwords and codes, points of contact, and trading partner agreements. |
| <b>Responsibility:</b>   | ECC trading partner subgroup  |
| <b>Action/Status:</b>    | Several agencies have developed draft EDI implementation conventions. These will be key pieces of the information package. NIH also has documentation for HTML transmissions.   |

## SOLICITATION OF TRADING PARTNERS

|                          |  |
|--------------------------|--|
| <b>Required Actions:</b> | Solicit trading partners to participate in the EC program.   |
| <b>Responsibility:</b>   | ECC trading partner subgroup   |
| <b>Action/Status:</b>    | This has been conducted through various means, including conversations between agency and trading partner representatives, formal projects like NewERA and FDP, and conferences like those of NCURA and SRA. |

## EXECUTION OF TRADING PARTNER AGREEMENTS

|                          |  |
|--------------------------|--|
| <b>Required Actions:</b> | Prepare and distribute the necessary trading partner agreements. |
| <b>Responsibility:</b>   | ECC trading partner subgroup                                     |
| <b>Action/Status:</b>    | Not necessary until informal testing is completed                |

# Appendix A Overall Approach to DOE Project and Procurement Systems

| Process supported   | Technical approach  | Task  | Schedule   |
|---|---|---|--|
| Management  |   | Obtain funding. Interface with other federal agencies and within DOE.   | FY97-FY98  |
| <b>Electronic Research Administration projects:</b> These projects extend automation to clients outside the ER complex and replace paper with electronic versions of documents. |   |   |  |
| General outreach  |   | Participate in Federal EC Working Group. Participate in NCURA and other outreach to research community. Work with national labs to define lab process. Coordinate meetings, conferences, demos, and discussions with research community and federal partners. Participate in NewERA project meetings. | FY97-FY98  |
| Solicitation  | Grants: operational on FEDIX  | Operate/upgrade service as needed.  | Operational  |
|   | Labs: move to FEDIX   | Add national labs to FEDIX.   | TBD  |
| Application   | Grants EDI: 194 transaction set for grant application, 841 transaction set and PDF for technical proposal | Participate in Federal EC Working Group and development of the 194 standard. Support Federal Demonstration Partnership. Manage Web security pilot. Develop ER electronic commerce gateway. Develop import capability for 194 to Integrated Procurement System.  | Application: operational January 1998<br>Security pilot will continue in 1998. |
|   | Labs: adapt 194   | Work with labs to define proposal application process. Develop importing and processing capability.   | TBD  |
| Merit review  | Web   | Work on federal standards. Work with national labs and program offices to define common approach for merit review between grantees and labs. Coordinate participation of university reviewers. Design and develop Web application. Import review information into corporate database.                 | 1½ years: FY98   |
| Status checking   | Web   | Coordinate participation of universities. Design and develop Web application.   | 1 year: FY98   |

| <b>Process supported</b>   | <b>Technical approach</b>       | <b>Task</b>  | <b>Schedule</b>                            |
|--|---------------------------------|--|--|
| <b>Progress reporting and continuation</b>   | EDI: 194                        | Work on federal standards. Develop common process for grantees and labs. Coordinate participation of universities. Design and develop import capability.   | TBD  |
| <b>Organization and professional profiles</b>  | Federal Web, EDI: 838           | Being handled under Federal Support Demonstration Partnership. Develop capability to access profiles.  | TBD  |
| <b>Award invoicing and payments; financial reporting; closeout</b>   | EDI: 850, 810/820               | Participate in coordination of Federal Support Electronic Commerce Committee, Federal Demonstration Partnership, DOE Procurement, DOE Operations Office, and ER.   | TBD  |
| <b>ER Corporate Systems:</b> These projects develop ER system capabilities for project and procurement management. |                                 |  |  |
| <b>New corporate system development</b>  | LAN and Web-based Visual Basic  | Determine scope and client base for replacement of Integrated Procurement System, Small Business Innovative Research System, and Research Information Management System. Work with ER-60 and programs to determine requirements. Develop system. | July 1997–December 1998                    |
| <b>Integrated Procurement System maintenance/enhancement</b>   | LAN-based FoxPro                | Develop ongoing enhancement as approved by ER-64.  | Ongoing until replaced by corporate system |
| <b>Small Business Innovative Research maintenance/enhancement</b>  | LAN-based FoxPro                | Develop ongoing enhancements as approved by ER-31.   |  |
| <b>Research Information Management System development/enhancement</b>  | LAN- and Web-based Visual Basic | Develop Phase 2: labs, abstract books, and reports. Develop Phase 3: more reports. Supplement Web with EDI 194.  |  |

## Appendix B      Milestones

| Milestone  | Date Due  | Date Complete |
|--|-----------|---------------|
| First exchange of a draft 194 transaction set                                      |           | Sep 1995      |
| Approval of 194 transaction set by X12   |           | Oct 1995      |
| Publish EC project plan  |           | May 1996      |
| Initial draft of 850 Award IC requirements   |           | May 1996      |
| BPWG defines two approaches: EDI and WWW   |           | Mar 1996      |
| ECC concurrence on a data element dictionary for a WWW grant application           |           | Oct 1996      |
| Draft data elements and white paper on organizational profile submitted to the FDP |           | Dec 1996      |
| Approval of the 194 Grant or Assistance Application federal IC                     |           | Jan 1997      |
| Submission of the invention reporting IC to the PFWG                               |           | Feb 1997      |
| Review of ONR/MIT data elements for 850 Award                                      |           | Mar 1997      |
| Publish second edition of the <i>EC Project Plan</i>                               |           | May 1997      |
| Present draft white paper and data elements to FDP for personal profiles           | Jun 1997  |               |
| Develop draft combined trading partner package                                     | Jun 1997  |               |
| First EDI encryption/electronic signature test                                     | Jun 1997  |               |
| First test exchange of 841 with proposal text data                                 | July 1997 |               |
| Combined 194/841 transmission test   | Aug 1997  |               |
| Secure 194/841 transmission test   | Sep 1997  |               |
| Approval of invention reporting IC   | Sep 1997  |               |
| Organization profile pilot test  | Fall 1997 |               |
| NSF test of 194  | Fall 1997 |               |
| Test of ONR 850  | Dec 1997  |               |
| Initial WWW site implementation  | Jan 1998  |               |
| Initial professional profile pilot test  | TBD       |               |

| <b>Milestone</b>  | <b>Date Due</b> | <b>Date Complete</b> |
|---|-----------------|----------------------|
| Draft progress reporting IC requirements                      | TBD             |                      |
| Draft 855 Award Acknowledgment data requirements              | TBD             |                      |
| Draft 860 Award Modification data requirements                | TBD             |                      |
| Draft 865 Award Modification Acknowledgment data requirements | TBD             |                      |

# Appendix C      EC in Action

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In pursuit of the policies described in this project plan, and because of growing operating pressures to do so, federal agencies are putting EC into action and using it as a tool for reengineering their business processes. This appendix illustrates through example how organizations are making effective use of EC/EDI. It is not intended to illustrate the scope or breadth of EC/EDI implementation.

## FEDERAL INITIATIVES

Individual federal agencies and organizations have been developing EC programs for several years now. A few of the largest users are the General Services Administration, the Department of Veterans Affairs, the Internal Revenue Service, the Customs Bureau, the Treasury Department, and DoD.

### Defense General Supply Center

An early EDI effort by the Defense General Supply Center (DGSC) makes a good case study of the benefits that can be achieved by combining EC with reengineered business practices.

The supply center, located in Richmond, VA, buys selected products for DoD and then distributes them to DoD customers as needed. DGSC typically bought large quantities of a material in order to obtain volume discounts and to ensure that material was available when requested. The material was bought from commercial manufacturers, shipped, and stored in a central warehouse in Richmond. As DoD users requested individual items they were pulled from the shelves and shipped again.

DGSC revised its practices by dramatically reducing the amount of military film inventory maintained. Now when requests for film arrive they are forwarded electronically to the manufacturers, who ship them directly to the end users. DGSC has saved approximately \$7 million annually in reduced warehouse handling and transportation costs for film alone. The supply center has extended the effort to other difficult commodities such as batteries, chemicals, and light bulbs. While saving money, the supply center has also improved performance, as the average time to deliver the material to the end user has been cut in half.

### Procurement

By far the largest federal EC program will be in procurement, as agencies respond to the President's memorandum<sup>10</sup> and to FASA. In this application agencies will release requests for quotations (RFQs) for goods and services as EDI transactions. The transactions will typically go first to specialized commercial EDI service organizations called value-

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<sup>10</sup> Presidential memorandum, *Streamlining Procurement Through Electronic Commerce*, October 1993.

added networks (VANs) or value-added services (VASs). The VANs will display the RFQs on bulletin boards. A VAN's customers (federal contractors) can review all applicable quotes and select the ones they wish to reply to. Each reply will cause the VAN to send an EDI transaction containing the quote back to the soliciting agency. At the agency, automated computer systems will aid buyers in making a selection and issuing an award. The award and any follow-up transactions will all be exchanged between vendor and agency using EDI transactions. Full implementation of this project will dramatically change the way companies do business with the federal government.

The contract to develop two competitive prototypes of the Standard Procurement System (SPS) was released in early 1997.

## Health Care Data

Hospitals have been participating in EDI for a number of years, primarily to procure supplies. EDI is also being used in processing health claim forms. The federal government is working with the insurance industry to establish a universal electronic health claim insurance form. DoD and others are developing electronic representations of X-rays and other patient information. Maintaining patient data electronically dramatically simplifies record retention and retrieval, and supports computer-enhanced analysis techniques. It also simplifies transferring records between facilities.

A separate EDI standard, HL7, has been developed to encourage the exchange of medical instrument and monitoring data (heart rates, blood pressure, etc.).

## State and Local Governments

State and local governments use EC in the same way as the federal government. Solicitation, award, invoicing, and payment for supplies and services are being handled by EDI. Fairfax County, VA, which has an extensive EDI program, was receiving separate bills from the local utility for electricity consumption at each of its facilities. Consequently, the county was making separate payments for each bill. After working with the utility, the county now receives a single, consolidated bill via EDI, with individual facility usage detail, and makes a single payment. The exchange of commercial tax data is also being conducted or planned by states such as Minnesota and South Carolina.

## Electronic Funds Transfer

Other federal EDI initiatives related to grants are those by the Treasury Department and DFAS to receive EDI invoices and use electronic funds transfer for as many payments as possible.

The passage of the Debt Collection Improvement Act of 1996 established mandatory EFT for all federal payments. Generally it requires the following:

- ♦ Within 90 days of enactment (July 26, 1996) all recipients newly entitled to federal payments (including contractors) must receive such payment by EFT. The provision will be waived if the recipient certifies in writing that he or she does not have an account with a financial institution or an authorized payment agent.

- ♦ By January 1, 1999, all recipients entitled to federal payments shall be paid by means of EFT.
- ♦ The act applies to all categories of DoD payments.

## EDI IN HIGHER EDUCATION

This section is taken directly from a white paper written by Joe Bass and Robert Unger entitled *Electronic Data Interchange in Higher Education—Draft Internet Release*.<sup>11</sup>

### Student Records and Transcripts: SPEEDE/ExPRESS

Each year institutions of higher education typically exchange thousands of student-related documents (e.g., transcripts, demographic data, course listings), and the volume is increasing. The processing costs associated with each transaction can be as much as \$30.

The Standardization of Postsecondary Education Electronic Data Exchange (SPEEDE)/Exchange of Permanent Records Electronically for Students and Schools (ExPRESS) project assists the exchange of student-related documents among education institutions. SPEEDE/ExPRESS uses EDI standards to facilitate the electronic exchanges. Over 500 colleges and universities<sup>12</sup> and 200 elementary and secondary schools are using or testing EDI for sending and receiving educational records.

### Admission Applications and Test Scores

EDI is also being used for transmitting admission applications. A number of admission service providers (clearinghouses, agents) are committed to using an EDI standard for client institutions. *Peterson's Guide* has developed a "universal" application and uses EDI to communicate data to any one of 277 participating institutions. National Computer Systems (NCS), a testing service, uses EDI in its Entrata electronic service to transmit admission applications and transcripts to postsecondary institutions from high schools.

NCS and other testing services, such as Educational Testing Service (ETS) and American College Testing (ACT), are also incorporating EDI into their operations to facilitate the exchange of test scores.

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<sup>11</sup> Joe Bass and Robert Unger, *Electronic Data Interchange in Higher Education—Draft Internet Release*, <http://web.fie.com/web/era/papers/edi-ed21.htm>, February 1997.

<sup>12</sup> Among the universities participating in SPEEDE/ExPRESS are Duke University, North Carolina State University, Ohio State University, Pennsylvania State University, University of California, University of Maryland, University of North Carolina, and the University of Southern California.

## Student Financial Aid

The Department of Education, through Project EASI (Easy Access for Student and Institutions), will implement EDI as the standard for facilitating the exchange of student financial aid data. When fully implemented, Project EASI will help students and their families plan for education beyond high school, choose among alternatives, and finance their choices. It will be an integrated delivery system for financial aid applications, processing, and payments.

A white paper for Project EASI outlines further uses of EDI, including defining a single transaction set for tracking student funds sent to institutions, and reporting on loan interest and balances through a standard student loan form transmitted to the Department of Education.

The Iowa Department of Education has extended EASI and made it EASIER (Electronic Access System for Iowa Education Records). Through EASIER, Iowa intends to develop a system to facilitate the exchange of student data “among schools, between schools and Postsecondary institutions, and between schools and the Department of Education.” EDI will facilitate the mission to reduce the data burden and improve data availability and accuracy, while maintaining cost-effectiveness.

The University of Wisconsin, through the Whitewater campus, is developing a statewide plan to provide transferring students with an automated summary of progress toward completion of a degree. This could lead to the development of a new transaction set under the SPEEDE initiative.

Also, the National Student Loan Clearinghouse (NSLC), a nonprofit organization sponsored by a consortium of colleges, guarantors, lenders, and servicers, makes use of EDI to simplify enrollment verification. NSLC developed and operates an Internet/EDI solution for transmitting enrollment verification data using an EDI transaction set.

## Postaward Administration

The Office of Naval Research has developed an automated system for creating, sending, reviewing and paying research grant and contract vouchers. For the past 6 years, ONR has been accepting invoices from participating universities in EDI format. Its EDI system was developed between 1989 and 1991 as a joint venture with the DFAS, MIT, and the University of Southern California. Since then, the system has processed thousands of invoices and hundreds of millions of dollars at universities and research nonprofits.

During the summer of 1996, the Defense Advanced Projects Research Agency (DARPA) became a participant in the program, meaning that DARPA’s grants and contracts can also be processed through EDI/EFT.

Participants cite these advantages:

- ◆ Low cost—EDI/EFT is fairly cheap and easy to establish. It eliminates low value-added tasks better performed by computers.
- ◆ Improved expenditure rates—By shortening the time between costs incurred and actual payment, agencies improve their performance expenditure rates.
- ◆ Security—EDI/EFT is more secure than paper vouchers.

- ♦ Accurate accounting—Automatic synchronization of accounts between the agencies and the payment office eliminates costly and time-consuming reconciliations.
- ♦ Error reduction—Since the project's inception, error rates on invoices have been reduced from 32 percent to less than 2 percent.
- ♦ Faster payments—Grantee organizations receive payments within 7 days of electronic invoice submission, compared to over 60 days for paper submission.

Since May 1996, ONR provided additional funding to the NewERA project to assist the expansion of the EDI/EFT payment system. The goal is to process electronically at least 75 percent of all ONR payments by the end of 1997.

## EDI with Vendors and Suppliers for Higher Education

As the private sector is rapidly adopting EDI as the standard for exchanging invoices, purchase orders, payments, etc., higher education institutions, as trading partners, are expanding use of EDI in response. EDI activity is often found in these administrative functions:

- ♦ Procurement, purchasing
- ♦ Accounting, accounts payable
- ♦ Mailing, shipping
- ♦ Warehousing
- ♦ Commissaries
- ♦ Libraries.

Often, companies will install an EDI capability at the institution, within the appropriate office, in order to save costs. For example, Federal Express will install a computer with software and communications capability to encourage high-volume customers to conduct business electronically.

In addition to traditional EDI, new applications are emerging for higher education that integrate EDI with the World Wide-Web. Research libraries, through a service provided by RoweCom, can order journals and publications through a Windows-based application. Following the selection of titles, the system generates a purchase order transaction set that is transmitted over the Internet to appropriate publishers, along with a payment order transaction set to the bank for processing. A third-party vendor provides security.

## EDI Courses and Research in Higher Education

As the importance of EDI in business, government, and education grows, higher education is responding with courses and programs directed toward understanding EDI as a business practice.

## Government and University Partnerships for EC/EDI Education

The Department of Defense, perhaps the largest user of EDI in the federal government, has created 11 Electronic Commerce Resource Centers (ECRCs) throughout the country. Through the Defense Logistics Agency, the government sponsors ECRCs as a forum to expand the use of digital information technologies among government agencies and small to medium businesses. The centers typically offer training, education, outreach, and technical support, with EDI as a primary activity.

Several higher education institutions (University of Scranton, Lamar University, George Mason University) operate these centers or are partners in their operation.

## Federal Procurement

Many colleges, universities, and other research organizations sell services and products to the federal government. The organizations will be participating in the federal procurement EC program, in which the government is mandating EDI formats and the federal EC telecommunications architecture as the only acceptable way to exchange procurement information.

## Appendix D     EDI Standards and Conventions

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One of the primary outcomes of identifying the functional requirements (Chapter 6) is identifying the federal agency's data requirements for each type of transaction: announcement of grant availability, grant proposal, grant award, etc. The transaction purpose and specific data requirements then have to be matched against existing ANSI ASC X12 EDI transaction sets.

### MAP DATA REQUIREMENTS TO ANSI EDI STANDARDS

Where a suitable match is found, each data element must be mapped to a specific location in the transaction set. This mapping is documented in an EDI implementation convention. In some cases no suitable X12 transaction set can be found, so a new transaction set must be designed and submitted to ASC X12 for approval. This was the case for the electronic grant application. In conjunction with LMI, in October 1994 we began designing a new transaction set to convey grant application data. This transaction set, the 194 Grant or Assistance Application, was approved by ASC X12 membership for publication in October 1995.

In other cases an overall appropriate transaction set can be found, but specific data elements cannot be mapped into it. In these cases we will submit data maintenance (DM) requests to ASC X12 requesting revisions to the standards to accommodate our additional data requirements. The tables below identify the status of this work.

## Determine Data Element Requirements

### PREAWARD

| Transaction Set/IC Application Name |                                   | Status  |
|-------------------------------------|-----------------------------------|---|
| 194                                 | Grant or Assistance Application   | Federal IC approved in January 1997   |
| 840                                 | Solicitation                      | Not initiated   |
| 850                                 | Award                             | Initial review in 1996; follow-up comparison of ONR/MIT requirements completed in March 1997. Follow-on action to continue in mid-1997. |
| 855                                 | Award Acknowledgment              | Not initiated   |
| 860                                 | Award Modification                | Not initiated   |
| 865                                 | Award Modification Acknowledgment | Not initiated   |
| ?                                   | Organizational Profile            | Draft data elements determined in December 1996   |
| ?                                   | Professional Profile              | Draft data elements determined in May 1997  |

### POSTAWARD ADMINISTRATION

| Transaction Set/IC Application Name |                     | Status  |
|-------------------------------------|---------------------|---|
| 810                                 | Payment Request     | Not initiated (except for ONR)                              |
| 820                                 | Remittance and EFT  | Not initiated (except for ONR)                              |
| 870?                                | Progress Reporting  | Not initiated   |
| 870                                 | Invention Reporting | IC submitted to FPWG in February 1997; awaiting FPWG review |

## Data Maintenance to X12

| Transaction Set/IC Application That DM Affects |                                 | Status  |
|--|---------------------------------|---|
| 194  | Grant or Assistance Application | Data maintenance was approved for publication by X12 in December 1995 |
| 870  | Invention Reporting             | Data maintenance was approved for publication by X12 in December 1996 |

## WRITE IMPLEMENTATION CONVENTIONS

As stated above, implementation conventions document the mapping of functional data to an EDI transaction set. In draft form, the implementation convention can be used as a consensus-building document as trading partners review it against their requirements. Once the IC is approved for use, it is the key document to drive the programming of translation software, interface programs, and functional databases.

As a part of the overall federal EC/EDI effort, the Federal EC Project Management Office has chartered the Federal EDI Standards Management Coordinating Committee (FESMCC)<sup>13</sup> to review and approve all ICs used by federal agencies.<sup>14</sup> For grants processing, the 194—Grant or Assistance Application draft IC (ASC X12 Version Release 003060), as developed by our grants EC Committee, was approved by the FESMCC in January 1997. For many other grants-related transactions, we will use existing procurement transaction sets (grant solicitation, award, award acknowledgment, etc.) with federally approved ICs already written. We will review these ICs and submit requests for changes. The tables below show the status of this work.

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<sup>13</sup> The DoD has established a parallel FESMCC to coordinate DoD component requirements.

<sup>14</sup> ICs are posted on the Federal EDI Secretariat WWW home page at <http://snad.ncsl.nist.gov/fededi>.

## Implementation Convention Status

| Transaction Set/Application Name |                                   | Status   |
|----------------------------------|-----------------------------------|--|
| 194                              | Grant or Assistance Application   | Done January 1997  |
| 840                              | Solicitation                      | Not initiated  |
| 850                              | Award                             | Use of federal 850 is intended. Exact data element usage by grants is being developed. |
| 855                              | Award Acknowledgment              | Not initiated  |
| 860                              | Award Modification                | Not initiated  |
| 865                              | Award Modification Acknowledgment | Not initiated  |
| 870                              | Invention Reporting               | Draft  |
| 810                              | Payment Request                   | Not initiated  |
| 820                              | Remittance and EFT                | Not initiated  |
| 194                              | Progress Reporting                | Not initiated  |

## Submission of Implementation Conventions to the FESMCC

| Transaction Set/Application Name |                                   | Status  |
|----------------------------------|-----------------------------------|---|
| 194                              | Grant or Assistance Application   | Approved by the FESMCC, January 1997  |
| 840                              | Solicitation                      | Not initiated   |
| 850                              | Award                             | Not initiated. Not anticipated, as existing federal IC is likely to support grant requirements. |
| 855                              | Award Acknowledgment              | Not initiated   |
| 860                              | Award Modification                | Not initiated   |
| 865                              | Award Modification Acknowledgment | Not initiated   |
| 870                              | Invention Reporting               | Submitted to FPWG, February 1997. A task group to work on invention reporting is being formed.  |
| 810                              | Payment Request                   | Not initiated   |
| 820                              | Remittance and EFT                | Not initiated   |
| 194                              | Progress Reporting                | Not initiated   |

## VERSION/RELEASE OF ASC X12 STANDARDS

The Data Interchange Standards Association (DISA) publishes an annual release of ASC X12 standards each December. The release contains all Draft Standards for Trial Use (DSTUs) approved for publication through the preceding October meeting of ASC X12. Each release represents a snapshot of a standards database that is continually evolving. In December 1995, 003060 (Version 3, Release 6) was published. Version 3, Release 6 incorporated the 194 transaction set.



## Appendix E Internet Home Pages

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The following tables list various federal agencies and other organizations with Internet home pages.

### FEDERAL AGENCIES AND OTHER ORGANIZATIONS

| Name  | Internet Address  |
|---|---|
| Air Force Office of Scientific Research         | <a href="http://web.fie.com/web/fed/afr/">http://web.fie.com/web/fed/afr/</a>                         |
| Army Research Office                            | <a href="http://www.aro.ncrn.net">http://www.aro.ncrn.net</a>   |
| Centers for Disease Control and Prevention      | <a href="http://www.cdc.gov">http://www.cdc.gov</a>   |
| Department of Transportation                    | <a href="http://www.dot.gov">http://www.dot.gov</a>   |
| Department of Education                         | <a href="http://www.ed.gov">http://www.ed.gov</a>   |
| Department of Energy                            | <a href="http://www.doe.gov">http://www.doe.gov</a>   |
| Department of Health and Human Services         | <a href="http://www.os.dhhs.gov">http://www.os.dhhs.gov</a>   |
| Department of the Interior                      | <a href="http://info.er.usgs.gov/doi/doi.html">http://info.er.usgs.gov/doi/doi.html</a>               |
| Environmental Protection Agency                 | <a href="http://www.epa.gov">http://www.epa.gov</a>   |
| National Aeronautics and Space Administration   | <a href="http://www.gsfc.nasa.gov/NASA_homepage.html">http://www.gsfc.nasa.gov/NASA_homepage.html</a> |
| National Institutes of Health                   | <a href="http://www.nih.gov">http://www.nih.gov</a>   |
| National Science Foundation                     | <a href="http://www.nsf.gov">http://www.nsf.gov</a>   |
| Office of Naval Research                        | <a href="http://www.onr.mil">http://www.onr.mil</a>   |
| U.S. Army Medical Research Acquisition Activity | <a href="http://www-usamraa.army.mil">http://www-usamraa.army.mil</a>                                 |

### FEDERAL SUPPORT ELECTRONIC COMMERCE COMMITTEE

| Name  | Internet Address  |
|---|---|
| Federal Support Electronic Commerce Committee | <a href="http://www.nsf.gov:80/bfa/cpo/start.htm#fse">http://www.nsf.gov:80/bfa/cpo/start.htm#fse</a> |

The following resources are available on line at the Federal Support Electronic Commerce Committee Web site :

- ♦ *EC Project Plan* (an electronic copy of this document)

- ◆ EC Project Plan briefing slides
- ◆ EC World Wide Web sites
- ◆ White paper on organizational profiles
- ◆ Draft data element list for organizational profiles
- ◆ White paper on organizational profiles (June 1997)
- ◆ Draft data element list for personal profiles
- ◆ Data entity matrix for the grant application WWW site.

## OTHER RELEVANT HOME PAGES

| Name                                   | Internet Address  |
|--|---|
| Federal EDI Secretariat                | <a href="http://snad.ncsl.nist.gov/fededi">http://snad.ncsl.nist.gov/fededi</a> |
| NSF FastLane Test Server               | <a href="http://www.fldev.nsf.gov">http://www.fldev.nsf.gov</a>                 |
| Electronic Commerce Program Office     | <a href="http://www.arnet.gov/ecapmo/">http://www.arnet.gov/ecapmo/</a>         |
| Dun & Bradstreet                       | <a href="http://www.dnb.com/">http://www.dnb.com/</a>                           |
| Data Interchange Standards Association | <a href="http://www.disa.org">http://www.disa.org</a>                           |
| Central Contractor Registration        | <a href="http://ccr.edi.disa.mil/">http://ccr.edi.disa.mil/</a>                 |

# Appendix F      Grants EC Committee Participants

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# Appendix G      Glossary

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|         |   |
|---------|---|
| ACH     | Automated Clearing House                                      |
| AFOSR   | Air Force Office of Scientific Research                       |
| ANSI    | American National Standards Institute                         |
| ARO     | Army Research Office  |
| ASAP    | Automated Standard Application for Payments                   |
| ASC     | Accredited Standards Committee                                |
| BAA     | Broad Agency Announcement                                     |
| BPWG    | Business Practices Working Group                              |
| CD-ROM  | compact disc-read-only memory                                 |
| CIS     | corporate information system                                  |
| COGR    | Council on Government Relations                               |
| CRISP   | Computer Retrieval of Information on Scientific Projects      |
| DARPA   | Defense Advanced Research Projects Agency                     |
| DFAS    | Defense Finance and Accounting Service                        |
| DGSC    | Defense General Supply Center                                 |
| DHHS    | Department of Health and Human Services                       |
| DISA    | Data Interchange Standards Association                        |
| DM      | data maintenance  |
| DoD     | Department of Defense   |
| DOE     | Department of Energy  |
| DoT     | Department of Transportation                                  |
| DSTU    | Draft Standard for Trial Use                                  |
| EAs     | Expanded Authorities  |
| EADP    | Emergency Access Demonstration Project                        |
| EASI    | Easy Access for Student and Institutions                      |
| EASIER  | Electronic Access System for Iowa Education Records           |
| EC      | electronic commerce   |
| ECC     | Electronic Commerce Committee                                 |
| ECRC    | Electronic Commerce Resource Center                           |
| EDI     | electronic data interchange                                   |
| EDIFACT | United Nations EDI for Administration, Commerce and Transport |

|         |   |
|---------|---|
| EFT     | electronic funds transfer   |
| E-Mail  | electronic mail   |
| EPA     | Environmental Protection Agency                                       |
| ER/DOE  | Energy Research, Department of Energy                                 |
| ERA     | Electronic Research Administration                                    |
| e-SNAP  | Electronic Streamlined Noncompeting Award Process                     |
| ExPRESS | Exchange of Permanent Records Electronically for Students and Schools |
| FACNET  | Federal Acquisition Computer Network                                  |
| FASA    | Federal Acquisition Streamlining Act                                  |
| FCS     | Food and Consumer Service   |
| FDP     | Federal Demonstration Partnership                                     |
| FECPMO  | Federal Electronic Commerce Program Management Office                 |
| FESMCC  | Federal EDI Standards Management Coordinating Committee               |
| FIPS    | Federal Information Processing Standards                              |
| FMS     | Financial Management Service  |
| FPWG    | Federal Procurement Working Group                                     |
| FRMG    | Federal Research Managers Group                                       |
| FWG     | Functional Working Group  |
| GAMS    | Grant Application Management System                                   |
| GITS    | Government Information Technology Services                            |
| GITSB   | Government Information Technology Services Board                      |
| HTML    | Hypertext Markup Language   |
| HTTP    | Hypertext Transfer Protocol   |
| IBM     | International Business Machines                                       |
| IC      | implementation convention   |
| IP      | Internet Protocol   |
| ISP     | Internet Service Providers  |
| LAN     | local area network  |
| LMI     | Logistics Management Institute  |
| MIT     | Massachusetts Institute of Technology                                 |
| NACHA   | National Automated Clearing House Association                         |
| NASA    | National Aeronautics and Space Administration                         |
| NCS     | National Computer Systems   |

|          |  |
|----------|--|
| NCURA    | National Council of University Research Administration                   |
| NEP      | network entry point  |
| NGMA     | National Grants Management Association                                   |
| NIH      | National Institutes of Health  |
| NIST     | National Institute of Standards and Technology                           |
| NPR      | National Performance Review  |
| NSF      | National Science Foundation  |
| NSLC     | National Student Loan Clearinghouse                                      |
| OCHAMPUS | Office of Civilian Health and Medical Programs of the Uniformed Services |
| OMB      | Office of Management and Budget  |
| ONR      | Office of Naval Research   |
| OPERA    | Office of Policy for Extramural Research Administration                  |
| OSTP     | Office of Science and Technology   |
| PC       | personal computer  |
| PDF      | Portable Document Format   |
| PUB      | publication  |
| RFQ      | request for quotations   |
| SPEEDE   | Standardization of Postsecondary Education and Electronic Data Exchange  |
| SRA      | Society of Research Administration                                       |
| USAMRMC  | US Army Medical Research and Material Command                            |
| USDA     | U.S. Department of Agriculture   |
| VAN      | value-added network  |
| VAS      | value-added service  |
| WWW, Web | World Wide Web   |



| REPORT DOCUMENTATION PAGE  |   |  | Form Approved<br>OPM No.0704-0188                               |   |
|--|---|--|---|---|
| Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources gathering, and maintaining the data needed, and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503. |   |  |   |   |
| 1. AGENCY USE ONLY (Leave Blank)   |   | 2. REPORT DATE<br><br>May 97                               |   | 3. REPORT TYPE AND DATES COVERED<br><br>Final |
| 4. TITLE AND SUBTITLE<br><br>Federal Grant Electronic Commerce Committee: EC Project Plan  |   |  | 5. FUNDING NUMBERS<br><br>C 263-96-C-0112<br><br>PE 0902198D    |   |
| 6. AUTHOR(S)<br><br>Donald F. Egan, Lisa Janssen   |   |  |   |   |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><br>Logistics Management Institute<br>2000 Corporate Ridge<br>McLean, VA 22102-7805  |   |  | 8. PERFORMING ORGANIZATION<br>REPORT NUMBER<br><br>LMI- ORS02S1 |   |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)<br><br>Department of Energy<br>Office of Energy Research ER64, 7215, GIN<br>19901 Germantown Rd<br>Germantown, MD 20874  |   |  | 10. SPONSORING/MONITORING<br>AGENCY REPORT NUMBER               |   |
| 11. SUPPLEMENTARY NOTES<br>Second Edition  |   |  |   |   |
| 12a. DISTRIBUTION/AVAILABILITY STATEMENT<br><br>A: Approved for public release; distribution unlimited   |   |  | 12b. DISTRIBUTION CODE  |   |
| 13. ABSTRACT (Maximum 200 words)<br><br>The current process used by several federal agencies for administering grants is resource-intensive and time-consuming. These agencies have formed a committee to foster the use of electronic commerce (EC) to reduce costs and improve performance in grants administration. In this project plan, the committee describes the benefits of EC for the agencies and their trading partners; provides a conceptual framework for implementing EC; presents goals, objectives, and strategies; identifies a supporting technical architecture; and provides an implementation time line.  |   |  |   |   |
| 14. SUBJECT TERMS<br>Grants, assistance, electronic commerce, electronic data interchange  |   |  | 15. NUMBER OF PAGES<br>92                                       |   |
|  |   |  | 16. PRICE CODE  |   |
| 17. SECURITY CLASSIFICATION<br>OF REPORT<br>Unclassified   | 18. SECURITY CLASSIFICATION<br>OF THIS PAGE<br>Unclassified | 19. SECURITY CLASSIFICATION<br>OF ABSTRACT<br>Unclassified | 20. LIMITATION OF ABSTRACT<br><br>UL                            |   |